IRON AGE

THE NATIONAL METALWORKING WEEKLY A Chilton Publication DECEMBER 29, 1960

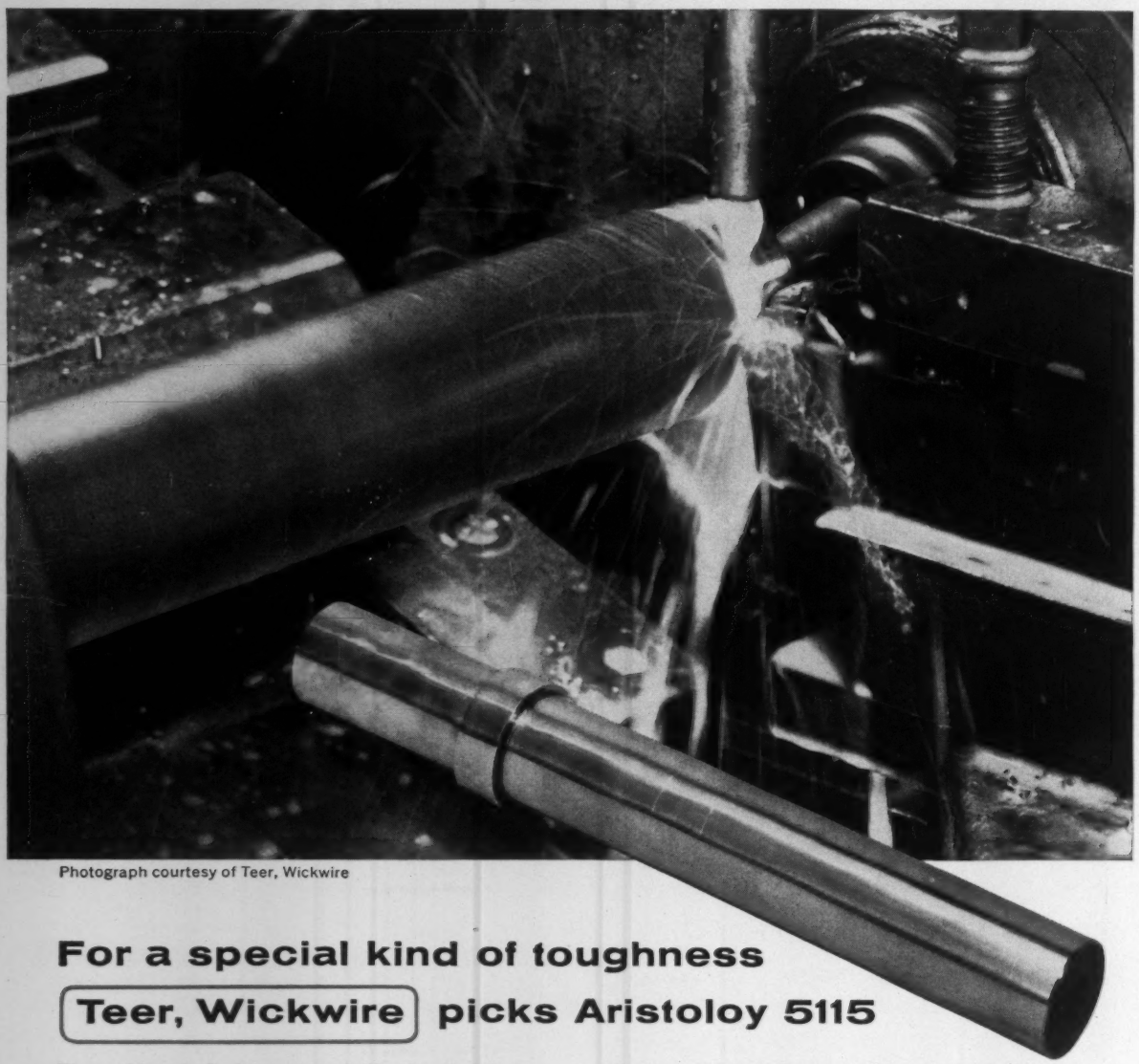
★ AMF's Hollander and Fosfield—

Friction Welding: A Fast Way to Join Metals p. 47

How World Steel Map Changes p. 25

Who Follows Goldberg at USWA? p. 28

Digest of the Week p. 2-3



Photograph courtesy of Teer, Wickwire

For a special kind of toughness

Teer, Wickwire picks Aristoloy 5115

These drive shafts have a rough life ahead of them. Used in the steering mechanism of trucks and heavy vehicles, they will be subjected to regular abuse and constant wear. This material, combining good carburizing potential and hardenability, results in a high strength core with excellent surface wear resistance.

If you have a special problem and would like assistance in selecting the right alloy for your job, call your nearest Copperweld representative or write us direct. We will be happy to study your problem—and to recommend the best alloy for your particular application.

For complete information about Aristoloy alloy, stainless and carbon grades send for NEW PRODUCTS & FACILITIES CATALOG.

ARISTOLOY STEELS

DIVISION OF
COPPERWELD
STEEL COMPANY

ARISTOLOY STEEL DIVISION • 4001 Mahoning Ave., Warren, Ohio • EXPORT: Copperweld Steel International Co., 225 Broadway, New York 7, N. Y.

Steel
for Strength
. . . Economy
. . . Versatility

Tool Steel Topics

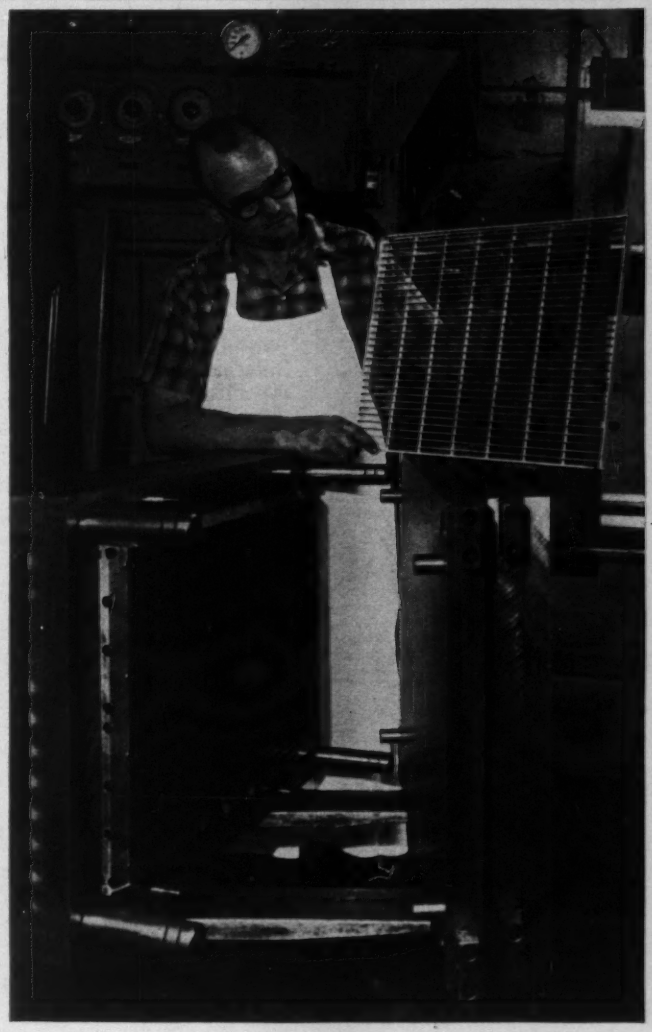
BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
Export Sales: Bethlehem Steel Export Corporation

Plastic grille for air conditioner molded

IN A BREEZE

with Lustre-Die



This plastic grille for an air conditioner was molded at the rate of one per minute by Midwest Plastics Corporation, Wichita, Kansas. Using a die made of Lustre-Die tool steel, they produced a perfectly formed grille, with a high sheen. The grille measures 21½ x 15 in., and is ½ in. thick.

Why Lustre-Die is ideal for plastic molders

Lustre-Die tool steel is ideal for plastic molders because it can be put right to work, without the need for heat-treatment. It's easy to machine, and it polishes beautifully . . . making possible an eye-appealing sheen on finished plastic parts.

Lustre-Die is an electric furnace steel. It has a well-balanced basic analysis. By adding a special alloy fortification, which increases its depth of hardenability, its fine mechanical properties are further improved. Because Lustre-Die is heat-treated in the mill by means of oil-quenching and tempering, it comes ready for machining and polishing. It is also carefully controlled during manufacture to insure freedom from porosity.

You can always count on a fine molding job when you use Lustre-Die. But don't take our word for it. Put Lustre-Die to work in a trial run. Your Bethlehem tool steel distributor can supply you.

BETHLEHEM TOOL STEEL ENGINEER SAYS:

Watch Out for Abrasion Caused by Scale

When punch-press operators are occasionally unable to obtain the required sheet stock in the usual cold-finished form, they substitute hot-rolled stock. However, this causes the service life of the punches and dies to drop to one-half or one-third of normal, or less. This result is largely due to the abrasion of the scaled hot-rolled surface on the cutting edges of the tools. Determining whether such a substitution is economical depends upon the results which are expected, and the cost, of each individual job.

One frequently hears the question: "What can be done in tooling to avoid this decrease in production?"

When punches and dies are normally made from water-hardening carbon tool steel (W-1 or W-2), or from manganese oil-hardening steel (O-1), the shortening of tool life can be avoided by changing to a high-carbon high-chromium tool steel, such as Bethlehem Lehigh H (D-2). This change usually overcomes the disadvantage of using the hot-rolled scaled stock.

However, if high-carbon high-chromium grades are already being used, there is only one method by which an appreciable improvement can be realized—the use of special heat-treatment operations. Typical treatments are short-cycle hardening, and nitriding. Complete details regarding these types of treatment may be obtained by writing Bethlehem Steel Company, Bethlehem, Pa.

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The IRON AGE

December 29, 1960—Vol. 186, No. 26

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News of the Industry

WORLD STEEL

A One World Market—During the past year, U. S. steelmakers have taken a long look at world

steel production — and markets. Foreign steelmakers have improved production and methods and are now competing across the board in quality and efficiency. P. 25

WHITE RETIRES

Republic Head Steps Down—Charles White, colorful, out-spoken chairman of Republic's Steel Corp. is retiring. T. F. Patton becomes chief executive officer. P. 27

GOLDBERG'S SUCCESSORS

Partners to Continue — Arthur Goldberg's law partners will take over as counsel to the Steelworkers. They are capable men and well-schooled in labor relations problems. But it's not official yet. P. 28

BRITISH STEEL UNION

No Strike in 50 Years—Editor George Sullivan reports on how the

Metalworking

Cover Feature

FRICTION WELDING—Progress in friction welding centers on a compact unit just announced by the American Machine & Foundry Co. Dr. M. B. Hollander (left) discusses it with Dr. H. I. Fusfeld, AMF's Director of Research P. 47

British steelworkers' union has gone through a half century without an official strike. And few cases have gone to arbitration in the period since 1917. P. 30

WORLD GROWTH RATES

What Changes Are Coming?—This concluding article on Our National Goals examines present—and expected—rates of economic growth in countries around the world. Also discussed: How changes will shape U. S. goals and policies. P. 31

Engineering-Production Developments

FRICTION WELDER

Joins Bars and Tubes — What commercial jobs can friction welders handle? A compact unit produces high-quality welds on metals, plastics and even ceramics in a fraction of a minute. This versatile unit uses the heat of sliding friction to weld or fuse objects. P. 47

HOLLOW SPRUES

Improve Castings—Successfully violating accepted foundry practice is a hollow sprue. Instead of a wide-open passageway, it's a thin-walled cylinder through which molten metal flows to reach mold cavities. These hollow sprues reduce production costs while improving casting properties. P. 50

FURNACE ANALYZER

Checks Heat-Treat Gases—Sample gases from a gantry furnace are rapidly checked by an analyzer-controller device. By monitoring four gases in only five minutes, this device automatically controls carbon-dioxide buildups within the furnace to ±0.02 pct. P. 52

SHEAR-FORMING MACHINE

Holds Tight Tolerances—A new machine shear-forms cylindrical and conical parts with diameters up to 70 in. At the same time, this cold-extrusion process reduces wall thickness. Tolerances are held to a few thousandths. P. 54

RADIO SYSTEM

Boosts Steel Flow — Two-way radios blanket all 350-acres of a tinplate plant. These radio networks coordinate four general areas: maintenance, truck and rail movements and general plant protection. Portable radios play a key role. P. 56

Market and Price Trends

BORING MILLS

Used for Grinding—There's added usefulness to be found in boring mills. They can be adapted to grinding operations for standard parts. And users can realize a significant saving in investment and changeover. P. 29

AUTOMOTIVE

Copper & Brass — Automakers still find that copper and brass can do a number of jobs better than other metals. And metal producers are working on a stainless finish for trim applications to expand automotive uses. P. 38

STEEL SUMMARY

How Much Rebound? — Some cutbacks in automotive orders have thrown a shadow over January. The first month of 1961 will show an improvement over December. But it may not be as significant as expected earlier. P. 69

PURCHASING

What System?—William J. McCabe, purchasing agent for Eastern Rolling Mills, says sales forecasts can be of real value in planning inventories. At least this system has worked successfully for his company. Here's a rundown on how it's done. P. 70

NEXT WEEK—Annual Forecast Issue

Planning for '61—Next week's annual issue will examine—industry by industry—the profit squeeze. It will detail both its causes and suggestions for reversing the trend. Also featured:

New Marketing Tool—A special section showing 1960 steel shipments by products to the 30 largest metalworking industry groups.

Forecasts for '61—Detailed forecasts on the outlook for sales, profits, selling prices, and costs.

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Armco ZINCGRIP Steel

Takes Deep Drawing, Thread-Rolling, Stamping and Forming without damage to coating

Galvanized Steel

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It provides the strength and rigidity of steel.

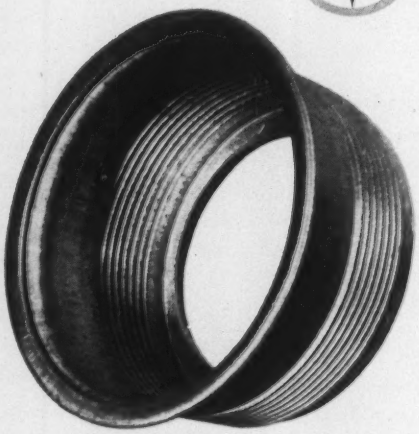
The special hot-dip zinc coating won't flake or peel despite the severest working.

Fabrication is done on standard production equipment.

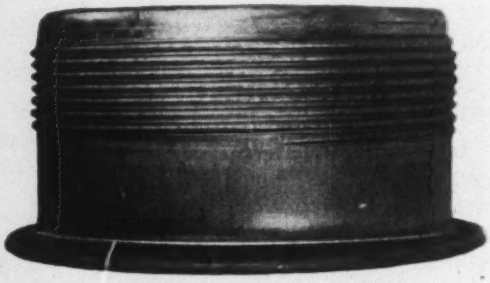
The full-weight zinc coating provides the most economical protection from rust and corrosion. Costs less than painting or plating.

These are reasons why Armco ZINCGRIP Steel has been used by thousands of manufacturers for more than a quarter-century. They also are reasons why this special zinc-coated steel may help *you* cut costs and improve the performance of your products.

Let us send you complete information on Armco ZINCGRIP Steel so that you can thoroughly evaluate its advantages in your programs to increase materials-efficiency and lower production costs. Just write Armco Steel Corporation, 3020 Curtis Street, Middletown, Ohio.



Protective cap for threaded pipe made of .0456" Armco ZINCGRIP Steel. Note the excellent adherence of the zinc coating on this deep drawn part, especially on the sharp bends and the rolled threads.



ARMCO STEEL

ARMCO

Armco Division • Sheffield Division • The National Supply Company • Armco Drainage & Metal Products, Inc. • The Armco International Corporation • Union Wire Rope Corporation

The Human Being: He Is Most Important!

This week most of us have been celebrating the birth of Christ, the approach of the New Year. Probably at no time in our history is it more fitting to do so.

Not only is the world sitting on a powder keg, but many of its inhabitants have fallen prey to pagan or materialistic fantasies.

Christ was the great champion of the individual. More than any other great religious teacher, he made it clear that man is entitled to dignity, kindness, and understanding.

We have embarked on a challenging era in this country where automation, space flights, and "conforming for the benefit of the whole" are common talk. But those on the East Coast of the U. S. in recent weeks had their comeuppance.

With all the vaunted machinery; with all the electronics; with all the weather gadgets and teletypes and predictions; the elements laid low at least three major cities. Hundreds of smaller cities and villages were prone on their collective backs in the snow.

It was up to the individual how fast our great complexes in New York, Philadelphia, and Washington came back to life. The telephone girls, the newsmen, the printers, the trainmen, the truck drivers, the repairmen, the policemen, the firemen, the teachers, and many more, faced tough challenges. Some failed to make it; others almost made it; and plenty made it with flying colors.

All the fuming and frustration of front offices with their electronic calculators and plan makers were nothing but side issues compared to the effort, spirit, and loyalty of those who made things work again.

The major point we make is this: In the times ahead, the big issue is the relationship of one with the other, of management with labor, of family with family, and, finally, the relationship of the human being with himself.

No matter what we face, no matter what we plan, and no matter what our leaders have in store for us—as Christ foretold—the dignity of the human being tops all other things in our daily lives —and in those space days to come.

So, if you and I do nothing else in this wonderful Holiday season but think upon the importance, the dignity, and the worth of the individual, we will have fulfilled our duty to our God—and to our fellowmen.

Tom Campbell

Editor-in-Chief

do your plans include mechanized drop forging?

The CECOMATIC Forging Process, based on the revolutionary Chambersburg Impacter, makes possible the continuous and automatic production of precision drop forgings. If you are a manufacturer whose products include drop forged components, you must consider mechanized forging in your plans for the future . . . . . your competition will do so—sooner or later. Practical information, with examples of successful mechanized forging operations, are included in the brochure, "The Automatic Production of Forgings in Closed Dies". Write for a copy today, to Chambersburg Engineering Company, Chambersburg, Pennsylvania.

CHAMBERSBURG

DESIGNERS AND MANUFACTURERS OF THE IMPACTER

Year Ends With Shakeout Complete

This year ends with little or no business carryover into 1961. This means that any recovery in the next six months will have to develop its own momentum. Right now, there is little concrete evidence of any buildup of that kind.

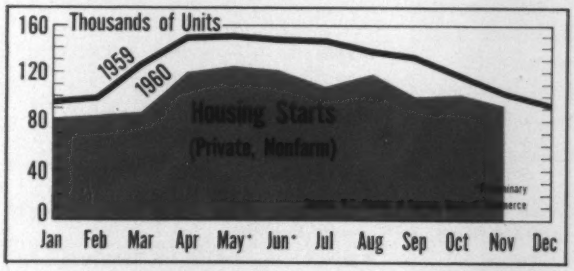
One thing is sure. January will be an improvement over December and there is just a chance that it can generate a little strength to build on. For one thing, December has been a shakeout month. This means not only inventories of materials, but, more important, finished products. The new year will start with little or no "water" in the economy. This means almost any pickup in any area of business will be felt immediately.

Steel Outlook Clouded

Orders for steel will be better in January. But the improvement will be one of comparisons with the December low point. In fact, there are some last minute indications that the January upturn will not be as significant as expected. The order rate is better, but new uncertainty in the auto industry is causing some concern. Best forecast now: No real upturn in steelmaking until March.

November Housing Starts Drop

The rate of building permits issued in November doesn't indicate much of an upturn in housing starts until next year. The 8 pct drop in November of private nonfarm homes, to 94,700, continues the general pattern of a decline since the second quarter. Seasonally adjusted, November starts were at an annual rate of 1,044,000 for the year. As noted in the chart, 1960



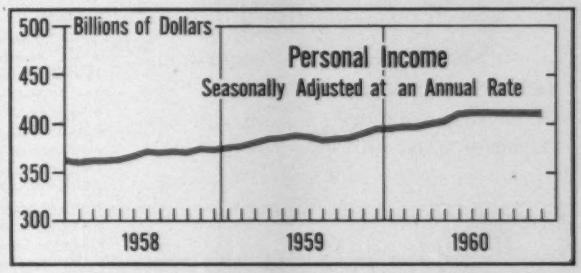
has been more erratic than 1959, but the general pattern has been similar, at a substantially lower level.

Dividends Match Year-Ago Rate

Dividends paid in November held to the level of the same month of 1959. In fact, in spite of some gloomy business results this year, payments of dividends through November of this year are 5 pct higher than for eleven months of 1959. Cash dividend payments by corporations issuing public reports totaled $388 million in November. This is typically a month of light dividend disbursements, the Office of Business Economics notes.

Personal Income Holds Up

Personal income continues to hold at a high rate, one of the few indicators to hold to a plateau in the



second half of 1960. The rate for November continued to hold at October's (revised) adjusted annual rate of $409.5 billion. Goods and services, nondurables, government payrolls all help hold the line.

Borrowers Continue Wary

Borrowers are not reacting strongly to easier credit terms. Since the third quarter, when interest rates were lowered, borrowing has shown little upsurge. Business loans through FRB members haven't grown much since June, the Mellon National Bank and Trust Co. reports. This trend is contrary to the usual seasonal advance, Mellon says.

In the same period, real estate loans were essentially unchanged. Other loans (mostly consumer loans) rose slightly, but by a much smaller amount than in the first half of '60. Total loans showed practically no net increase from June to November this year.

Ore Stocks at High Level

Ore stockpiles at lower Great Lakes ports will probably total about 53 million tons at the start of the 1961 Lakes shipping season. This is compared with a normal tonnage of about 37 million. This high level, plus the effect of growing imports of ore, make the early outlook for the Great Lakes fleet, and domestic ore producers, decidedly gloomy. Nevertheless, final Lake shipments were 69.6 million tons, best since 1957's 84.6 million, because of the post-strike buildup.

THE TEST
of Morgan Rolling Mills
is in their use—and repeat orders

Republic Steel Corporation
- 1—24" Billet Mill
- 3—21" Billet Mills
- 2—18" Billet Mills
- 1—19" Billet and Sheet Bar Mill
- 4—18" Billet and Sheet Bar Mills
- 1—16" and 14" Merchant Mill
- 1—11" Merchant Mill
- 3—12" Merchant Mills
- 1—10" Merchant Mill
- 1— 8" Merchant Mill
- 4—10" Roughing Mills
- 1—10" Skelp Mill
- 1—18" Sheet Bar Mill
- 1—35" Blooming and Billet Mill
- 1—10" Wire Rod Mill
- 1—10" Merchant and Rod Mill
- 1—14" Strip Mill
- 1—22½" Sheet Bar Mill
- 1—11" Merchant Mill

30 Mills

United States Steel Corporation
- 1—24" Billet Mill
- 1—18" Billet Mill
- 1—16" Billet Mill
- 2—14" Billet Mills
- 1—10" Hoop and Cotton Tie Mill
- 1—13" Merchant Mill
- 1—11" Merchant Mill
- 2—10" Merchant Mills
- 1—18" Sheet Bar Mill
- 1—10" Rod and Cotton Tie Mill
- 1—12" Roughing Mill
- 1—10" Merchant and Strip Mill

National Tube Division
- 1—18" Skelp Mill

American Steel and Wire Division
- 1—18" Billet Mill
- 1—13" Billet Mill
- 1—10" Strip Mill
- 3—10" Rod Mills
- 1— 9" Wire Rod Mill
- 1—4-Strand Rod Mill

Columbia-Geneva Steel Division
- 1—10" Rod Mill

Tennessee Coal & Iron Division
- 1—21" Billet and Sheet Bar Mill

25 Mills

Bethlehem Steel Company
- 1—30" Billet Mill
- 1—24" Billet Mill
- 1—18" Billet Mill
- 3—18" Billet and Sheet Bar Mills
- 2—12" Merchant Mills
- 3—10" Merchant Mills
- 1— 8" Merchant Mill
- 1—12" Skelp Mill
- 2—10" Wire Rod Mills
- 2—10" Wire Rod and Merchant Mills
- 1—10" Wire Rod Finishing Mill
- 1—Wire Rod Mill

19 Mills

Jones & Laughlin Steel Corp.
- 1—20" and 16" Billet Mill
- 1—21" Billet Mill
- 1—18" Billet Mill
- 1—21" and 18" Sheet Bar Mill
- 1—14" Merchant Mill
- 1—13" Merchant Mill
- 1—12" Merchant Mill
- 1—11" Merchant Mill
- 1—10" Merchant Mill
- 1—10" Skelp Mill
- 2—10" Wire Rod Mills

12 Mills

Youngstown Sheet & Tube Co.
- 1—24" and 18" Billet and Slab Mill
- 1—24" and 18" Billet Mill
- 1—14" and 18" Merchant Mill
- 1—12" Merchant Mill
- 1— 9" Merchant Mill
- 1—18" Sheet Bar Mill
- 1—21" Sheet Bar and Skelp Mill
- 2—10" Skelp Mills
- 1—10" Wire Rod Mill
- 1—10" Merchant and Rod Mill
- 1—21" Billet and Slab Mill

12 Mills

Armco Steel Corp.
Sheffield Steel Division
- 1—19" Sheet Bar Mill
- 1—12" Roughing Mill
- 1—18" Billet Mill
- 2—10" Rod and Merchant Mills
- 2—12" Merchant Mills
- 1—10" Rod Mill

8 Mills

We picked this one page from our book

"70 YEARS of Rolling Mill Progress"

Additional pages of lists tell a further story of why you see

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WORCESTER, MASSACHUSETTS

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RM-84

Major Industries Face Negotiations in '61

During the coming year contracts in a number of key industries are due for renegotiation. Most important bargaining will be in the auto industry. But other important contracts expire in trucking, rubber, and machinery. And coal contracts are subject to reopening on 60-day notice.

About 120 contracts, or about 40 pct of agreements covering 5000 or more workers each and affecting 2 million workers, will expire. Another 60 contracts covering 1.4 million workers have wage reopening provisions.

United Auto Workers contracts with General Motors Corp., Ford Motor Co., and Chrysler Corp. expire in August. American Motors Co. follows by a month. The Budd Co.'s contract expires in October, and Studebaker-Packard Corp.'s in November.

The UAW is also due to renegotiate contracts with Caterpillar Tractor Co., Deere and Co. and International Harvester Co. in the farm equipment field in August and September.

United Rubber Workers' contracts expire as follows: Firestone Tire & Rubber Co. and Goodyear Tire and Rubber Co., in April; United States Rubber Co. in May; and B. F. Goodrich Co. in June.

Teamsters start negotiating both local and over-the-road contracts in the Central States in January.

Need and Logic Rule Creation of New Job

An employer can take part of an established job and create a new job classification. That's the ruling of a three-member arbitration board in a case involving The Linde Co. and the Oil, Chemical and Atomic Workers.

Linde created a new classification of test inspector. The work had previously been done as one of many duties of workers in other classifications in the metal shop. The new classification was moved out of the metal shop and put in the inspection department.

The union contended: The job wasn't new; it shouldn't have been transferred from fabrication to inspection.

The board based its decision on two principles: First, an increasing volume of work justifies creating a new job. Second, logic and efficiency govern the department in which the job is established.

Kennedy Plans Labor Management Council

President-elect Kennedy and his Secretary of Labor, Arthur J. Goldberg, plan to foster industrial peace through a White House labor-management council.

If the new Administration does no better than President Eisenhower and his Labor Secretary, James Mitchell, and others before them, the council is doomed to failure.

Some top Labor Dept. officials say there is little hope for an effective council on labor problems.

Weapon Against Wildcats

A new weapon against wildcat strikes proved effective recently in a walkout by 1000 Steelworkers. Seven days after it started, the strike was ended by an injunction from a Federal District Court.

The stoppage involved work rules and new equipment at the Donora, Pa., plant of Page Steel & Wire Div., American Chain & Cable Co. Workers were ordered back to their jobs and arbitration was directed.

This action applied a new doctrine of labor law — that a Federal Court may enforce no-strike contracts by issuing injunctions.

Final rulings in recent Supreme Court cases gave Federal Courts sweeping authority in the matter of compelling arbitration. The cases tested provisions of the Taft-Hartley Act.

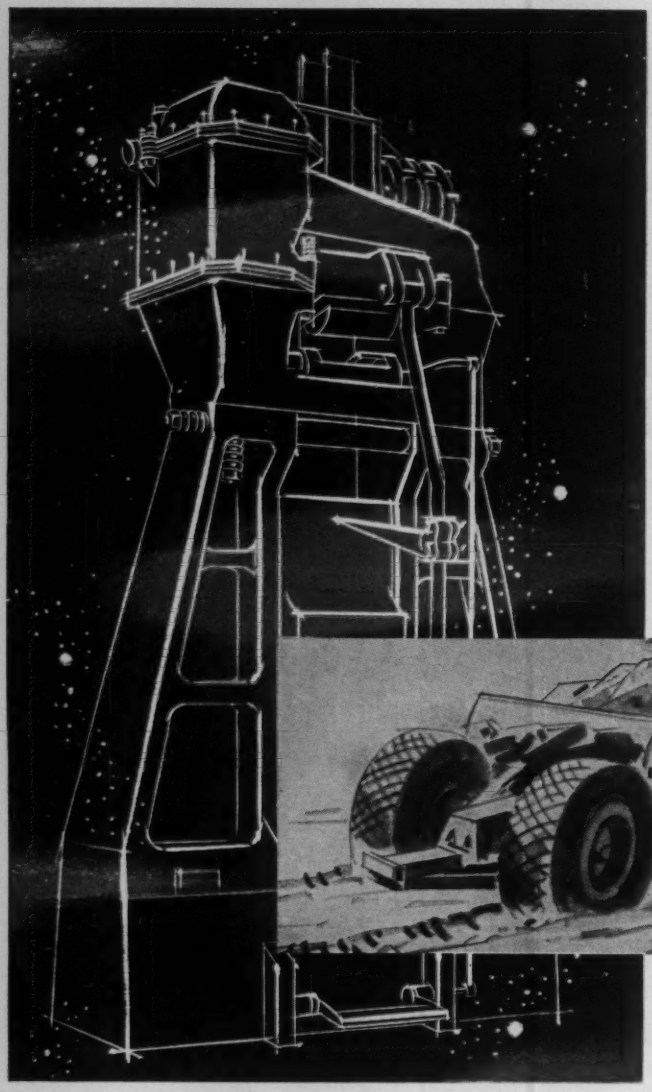
The Supreme Court held a company must arbitrate on things like subcontracting. This had always been considered a management right. And there must be arbitration of matters that are "patently frivolous."

Some labor relations men felt the court had thrown labor contracts up for challenge and invited a "flood of grievances." (IA—Sept. 22 '60, p. 9).

However, the rulings had implications in another direction. The court reasoned that a union agrees to a no-strike provision in return for arbitration relief.

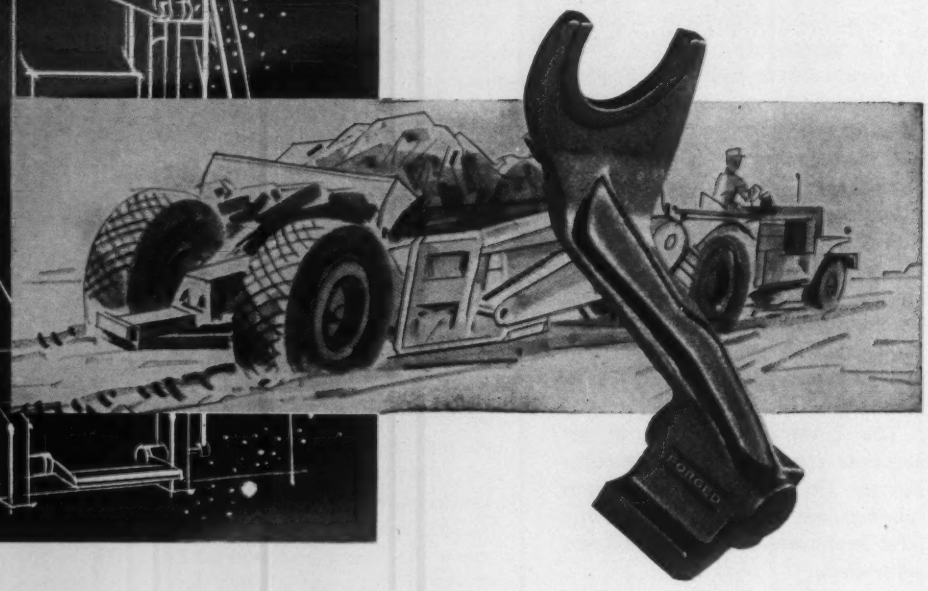
From this, company lawyers argued, it followed that management is entitled to legal enforcement of the no-strike provision. This view has been accepted in the Page Steel case and another in the Tenth Circuit Court of Appeals.

A Supreme Court ruling is being sought in the Tenth Circuit case. If the high court decides in favor of no-strike enforcement, companies will have a legal tool useful in their efficiency drives.



Modern board forging hammer

DEPENDABILITY of shifter fork improved by designing it to be FORGED



By designing the shifter fork of his transmission to be forged, a manufacturer of earthmovers eliminated costly equipment breakdowns in the field because of fork failure. Factor of safety was *in*creased even while weight and over-all costs were being *de*creased.

Parts scrapped because of voids uncovered after much high-cost machining are eliminated . . . forgings are *naturally* sound all the way through. Forgings start as *better* metal . . . are further *improved* by the compacting hammer-blows or high-pressure of the forging process.

Design your parts to be forged . . . increase strength/weight ratio, reduce as-assembled cost, improve performance. Literature to help you design, specify, and procure forged parts is available on request.

When it's a vital part, design it to be FORGED

Drop Forging Association • Cleveland 13, Ohio

Names of sponsoring companies on request to this magazine

★ Business Issues in Congress

The 87th Congress convenes next Tuesday. As soon as it begins, Congress will take up legislation affecting industry.

Many major bills which failed last year will be back. New bills on old subjects will get special attention. Behind legislative meanderings will be the watchful eye—and sometimes the strong arm—of President John F. Kennedy. Here's what to look for in Congress:

A bill to raise the $1.00 an hour minimum wage to $1.25—or at least $1.15—will be reactivated. The legislation will also seek broadened worker coverage.

Depressed area legislation, vetoed by President Eisenhower in the past session, will be back. It will call for about $250 million in Federal loans to aid economically depressed areas.

Bills to provide Federal aid to schools and home construction will be unveiled in a new, more costly form.

Attempts to legalize common site picketing and secondary boycotts will be made through legislation.

Action on depreciation reforms will be taken. Other tax reform measures may find their way to a vote.

Legislation calling for presidential hearings on price and wage increases will be aired. Along these lines, the Congress will also see bills calling for corporation pre-merger notification to Federal agencies and for destruction of the "good faith" defense to price discrimination charges.

Restoration of a tax reduction for lobbying as a business expense should come to a vote.

Bills to spur U. S. investment overseas will be considered.

Undoubtedly, Congress will also take up legislation dealing with patents, pollution, medical care for the aged, and reorganization of regulatory agencies and the Defense Dept.

▪ Anti-Recession Measures to Be Pushed

On Jan. 20, the day John F. Kennedy takes office, he will set in motion an emergency program to aid economically depressed areas in the U. S. The following actions, which will also stimulate business activity, could be among those President-elect Kennedy will institute. He may:

Grant special concessions to firms in the depressed areas bidding for government contracts.

Revise the Federal highway program to get more road projects underway.

Launch public works projects which have been authorized by Congress but not started.

Set up rural redevelopment programs under existing legislation.

▪ "Buy American" Drive Builds Up

The "Buy American" drive has grown by leaps and bounds. And it will keep growing.

Latest action to stimulate the program, part of a drive to reduce U. S. gold reserve losses, comes from the Defense Dept. Military units overseas have been ordered to buy U. S. goods unless foreign bids beat domestic prices by 25 pct.

Congress will get in the act come January. A Congressional "Buy American" commission may be set up to investigate the impact of foreign products on the U. S. market.

▪ Go-Ahead on Polaris

The Polaris missile and submarines to fire it are getting the green light all over Washington.

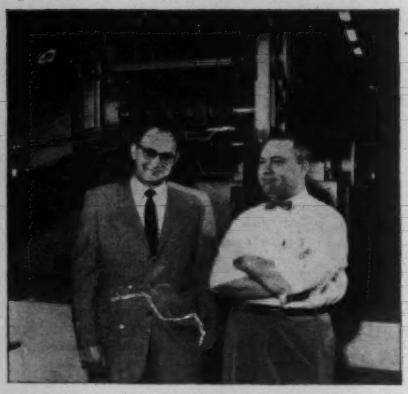
The President-elect and the Pentagon have given the go-ahead signal to the Polaris program. Congress is expected to follow their example.

▪ Defense Revamping To Move Slowly

There will be no immediate reorganization of the U. S. Defense Dept. Despite Sen. Stuart Symington's plan for sweeping changes, there is too much opposition to the move for any quick action.

McNAMARA: Go slowly.

Top armed services committee congressmen openly oppose the revamp. And Robert S. McNamara, the new Secretary of Defense, foresees no early reorganization of the Pentagon. Mr. McNamara says, however, that if he sees the need for changes at a later date, they will be made.



Ed Weiner, president, talks with Ed Lebowitz, right, Chesterfield's superintendent, by one of the firm's three Wean Equipment slitting lines.

Chesterfield Steel relies on speed, accuracy, durability of Wean coil processing lines

Fast delivery—when, where, and how the customer wants it—is the metal warehouse's stock-in-trade. And Ed Weiner, president of Cleveland's Chesterfield Steel Service Co., is proud of the firm's record for on-time, "on-spec" deliveries of strip and sheet steel, nonferrous and coated metals.

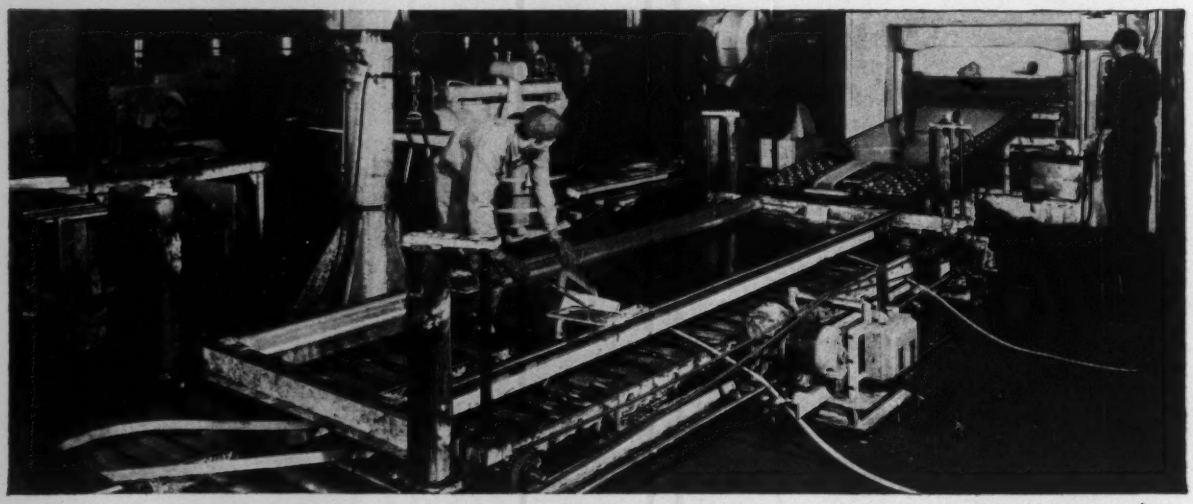
To maintain this reputation for service, Chesterfield needs equipment that will maintain its accuracy under tough, 3-shift, week-long operation. That's why this progressive firm has installed three Wean slitting lines and the 52″ Wean flying shear line shown below . . . and is ordering another flying shear line for 60″ wide strip. Most of the firm's orders for sheet material pass through this coil processing equipment, making both speed and reliability of operation vital. Mr. Weiner notes that the Wean 52″ flying shear line has doubled sheet production over other types of lines previously used by Chesterfield.

Like Chesterfield, Wean has established a reputation as one of the most knowledgeable firms in the field of coil processing and has built equipment that is now serving many of the country's largest metalworking firms. Write for a brochure covering the important savings *you* can realize from coil processing.

WEAN EQUIPMENT CORPORATION
22800 Lakeland Boulevard
CLEVELAND 17, OHIO

WEAN

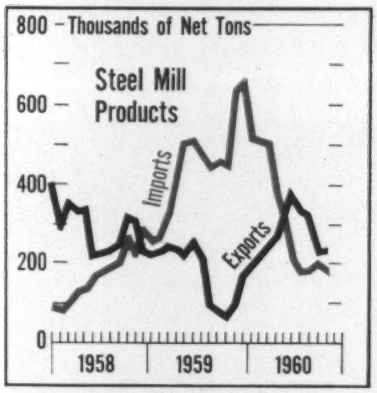
Wean flying shear line has elevating run-out conveyor and side guides which adapt to pack height.



Steel Exports Rise As Imports Drop

Exports of steel mill products in October rose slightly over the September figure. Meanwhile, imports dropped off considerably.

According to Dept. of Commerce statistics, October exports rose to 231,000 net tons. This is an increase of 3000 tons from September but still represents the second lowest month since March.



However, imports dropped 27,000 tons from September to a total of 180,000 tons. This is just 3000 tons above the year's low recorded in July.

Steel sheets and tinplate are still the chief export products and accounted for 70 pct of October's shipments abroad. Concrete reinforcing bars and sheets are responsible for the decline in imports.

U.S. Banks Aid Japanese Steelmakers

While the U. S. has announced plans to drop technical aid for Japanese industries in 1962, steelmakers there aren't worried. They're still able to get financial assistance from American banks.

U. S. Ambassador to Japan, Douglas MacArthur II, says technical aid to Japan has cost this country more than $12 million since 1955. He notes that this has been responsible for about 20 pct of the Japanese production gain since that time.

Meanwhile, two Japanese steelmakers have recently tapped U. S. banks and the World Bank for financial aid to the tune of $22.8 million. The First Boston Corp. joined with the World Bank in lending $10 million to Kawasaki Steel Corp. The funds will be used as part of the cost of installing a plate mill near Tokyo.

And, Kidder, Peabody & Co., Inc., went together with the World Bank and made $12.8 million available to the Sumitomo Metal Industries, Ltd. Sumitomo, too, is a private Japanese steel producer.

Rockwell Says India Offers Challenge

Col. Willard F. Rockwell, board chairman of both Rockwell-Standard Corp. and Rockwell Manufacturing Co., says, "India presents possibly the greatest opportunity and the greatest challenge of this age."

Col. Rockwell, just back from visiting affiliates in India and Europe, notes that the country has "tremendous and virtually untapped natural resources, including water power." He notes India remains industrially backward in many ways.

In automotive production, for example, India "utilizes some modern equipment, but tremendous amounts of hand labor. The desire to keep men employed supersedes the desire to increase production through more modern methods. With it all, however, a good quality of fabricated automotive parts are made and assembled into trucks and automobiles."

Fenn Licenses Japanese Company

Fenn Manufacturing Co. has signed a licensing agreement with Komatsu Manufacturing Co., Ltd., of Japan to build and market the Fenn line of rolling mills and related metal forming equipment in Japan and adjacent Asiatic areas.

Komatsu, one of Japan's largest machinery manufacturers, is headquartered in Tokyo.

Willys Finds Seaway Use Is Cheaper

The St. Lawrence Seaway is proving to be profitable to Willys Motors, Inc., and its customers.

The jeep manufacturer shipped a record 5229 vehicles through the Port of Toledo and the Seaway this year. This is 45 pct more than shipped in 1959, and nearly triple the volume of 1958.

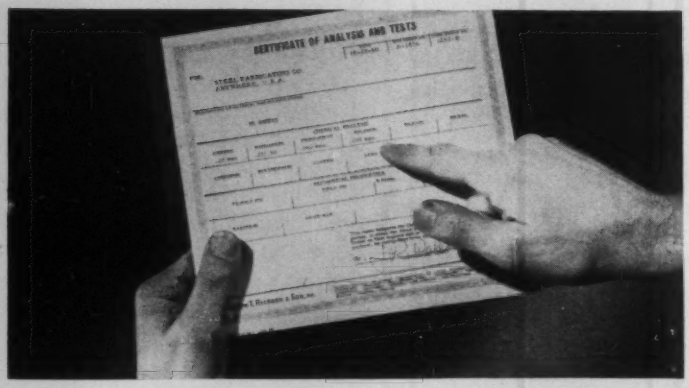
Willys says its customers in many foreign countries realized savings on an average of $29.40 per unit this year because of the Seaway. Savings on freight and shipping totalled $153,720 for the units routed through the Toledo port. This is compared to shipping rates through New York.

More Canadian Roads

Highway construction continues at record paces in Canada. In fact, surfaced roads in Canada have been augmented in the past ten years by nearly 70 pct, or 120,000 miles.

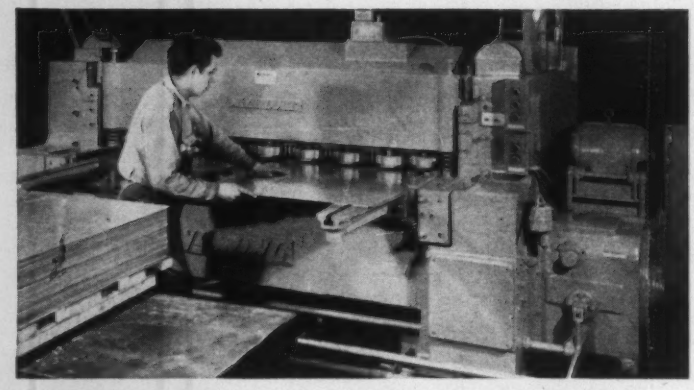
Expenditures for the Canadian highway program jumped from $315 million in 1949 to last year's $1.2 billion. According to the Canadian Good Roads Assn., highway construction should continue to boom there for the next several years.

How Ryerson gives you EXTRA VALUE IN SHEET STEEL



Carbon control—Did you know that Ryerson can furnish a conformance report, if requested when your order is placed, certifying that hot or cold rolled low carbon sheets in stock sizes are SAE 1008 with maximum carbon content of .10? This means you can minimize or eliminate problems of variation in formability and weldability.

Closest cutting tolerances—Our standard "aim" tolerances are the closest in the industry. For example, on shearing of sheets: width or length tolerance—under 48″, -1/32″; 48″ and over, -1/16″. These limits can be guaranteed upon specific request, given in advance of processing your order.



Fast, dependable service—Hundreds of customers often cite these two major reasons for ordering from Ryerson: absolute confidence in "dependability of service as promised," and speed of service to meet their most critical requirements.

Whatever your sheet and strip requirements, a Ryerson specialist is ready to consult with you. A phone call is all it takes.

METALOGICS
RYERSON PLUS VALUE

STEEL • ALUMINUM • PLASTICS • METALWORKING MACHINERY

RYERSON STEEL®

Joseph T. Ryerson & Son, Inc., Member of the INLAND® Steel Family

SERVICE CENTER PLANTS: BOSTON • BUFFALO • CHARLOTTE • CHICAGO • CINCINNATI • CLEVELAND • DALLAS • DETROIT • HOUSTON • INDIANAPOLIS
LOS ANGELES • MILWAUKEE • NEW YORK • PHILADELPHIA • PITTSBURGH • ST. LOUIS • SAN FRANCISCO • SEATTLE • SPOKANE • WALLINGFORD

Spin Finish Odd Shapes

Spin finishing takes the place of hand buffing for odd-shaped automotive parts. In essence the process simply power spins parts through a dry, granular compound such as corn meal. The spinning action is much faster than tumbling. Fixtured parts are submerged and spun through the compound in the machine's tub. This process finishes complex parts that can't be tumbled.

Starch Protects Metal

Protective and decorative coatings for metal, glass and wood have been made from dialdehyde starch. This starch is obtained from wheat, corn or sorghum. Starch derivatives form a coating on materials such as glass that resists boiling water for as long as 10 hours. These coatings also remain intact after immersion in acetone, dilute sulphuric acid or ethyl alcohol.

Ceramic Liners for Pumps

A ceramic maker had a problem with vane-type rotary pumps. Running at 1200 rpm, these pumps delivered 12 gpm at 400 psi. Vane chatter caused self-destruction with an average service life of 700 hours between failures. The company replaced hardened-steel liner rings with its own product. Results? The first unit has been operating 80 hours a week for over two years at 1800 rpm with an output that now equals 18 gpm.

Load-Bearing Walls

Aluminum panels, stronger than plaster or "dry" walls, serve as curtain walls or as load-bearing members that also support a building's roof. These sandwich panels consist of an exterior surface of baked-enamel aluminum sheet, a thick core of foam-plastic insulation and an interior that's made of tempered hardboard.

Speeds Sulphur Removal

Tests in Great Britain prove that sulphur-to-slag transfer is a thermally-activated process. Transfer stages are chemical in nature and hinge on the breaking of metal-oxygen bonds in oxide slags. Addition of calcium fluoride increases transfer rates at temperatures between 1400°-1600°C. As sulphur transfers to the slag, it builds up a negative charge within the slag. To restore electrical neutrality, this charge must be balanced by slag-to-metal anion transfer.

Automated Soldering Line

For a long time, soldering has stalled all attempts at automation. Conditions must be just right for success. Leading the way to automatic soldering is a new in-line unit that solders the joints on printed-circuit boards. One of the main gains is a big drop in unit-production costs. Other bonuses include the elimination of cold-joint, trouble-shooting and rework problems.

Stretching Forms Shapes

Soviet scientists have proposed a new method for obtaining bars with periodic changes in cross section. It consists of local induction heating followed by the application of axial stretching. First, the bar feeds through an induction heater's working zone. Then it's stretched. By reducing costs, this method boosts the use of bars with periodic changes in cross section.

Bearings Withstand 1500°F

One of the most common causes of failure in bearings is fatigue. Sleeve bearings which aren't perfectly aligned encounter cyclic stresses. Ball and roller bearings, on the other hand, are susceptible to rolling fatigue. Hot-fatigue data are scarce. However, figures from Belgium indicate that bearings made from cobalt-base alloys resist fatigue at temperatures to 1500°F.

Easier Programming

A new concept promises dual service in language translation for electronic computers. Known as GECOM, this general-compiler system automatically translates English-language instructions into computer code. Instead of using separate computer languages for different fields, GECOM uses the same code to solve both business and scientific problems. This makes computers easier to use by reducing programming-feed time.

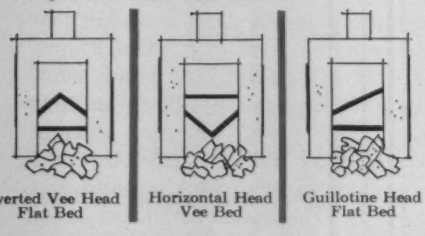
HARRIS CS-750

designed for economy

Shears Bulky No. 2 and No. 1 Heavy Melt Scrap

Whether your scrap is uniform industrial, plate, structural or pipe . . . ship, railroad, automotive or agricultural and the many types found on the average yard there is a Harris Hydraulic Scrap Shear designed for your operation. You can enjoy greater competative advantages with Harris Shears working on your yard. *Talk with a Man from Harris.*

Choose the Hydraulic Shear Crosshead Knife and Bed Arrangement best suited to your operation. Only HARRIS makes this offer.



Inverted Vee Head Flat Bed | Horizontal Head Vee Bed | Guillotine Head Flat Bed

Since 1889

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Editorial Praise

Sir — As a subscriber to The IRON AGE, I find your editorials most impressive and penetrating. Unfortunately, I do not keep all of the editions and I failed to remove the editorials to be filed away for my future reference. So I am wondering if you might have extra copies of your editorials for the entire year 1959 and 1960 to date. I have been wondering why it would not be a good idea for you to compile a book of these editorials each year for either free distribution to the subscribers or for a nominal charge. —C. D. Hicks, St. Louis, Mo.

■ **We're sorry to say we don't have a complete file. But your idea is most interesting.—Ed.**

Sir—I thought it might be encouraging to you to know that I have heard a good many salutary comments regarding your forthright editorial comments in each issue of The IRON AGE. We enjoy them very much and look forward with anticipation to receiving each issue. We always start the technical reading with a strong "shot in the arm" from your comments. We regard this as a personal favor you are extending us. — Gene LaHelle, General Electric Co., Richland, Wash.

Goals Copy

Sir—In your Dec. 1 issue on p. 95 the article entitled, "Our National Goals—No. 1," refers to the Commission making its final report to the President. We would like a copy of the full text of the report. Please let us know if you can obtain such a copy or where we could get one.—J. R. Joynt, A. J. Boynton & Co., Chicago, Ill.

■ **You may obtain a copy of the report by writing the President's Commission on National Goals, 722 Jackson Place, Washington, D. C. —Ed.**

On Purchasing

Sir—I have been meaning to write to thank you for the purchasing articles that have been appearing in The IRON AGE. Since there are many capable men in purchasing, I'm sure you'd have no trouble getting them to contribute. Incidentally, I still like Tom Campbell's editorials. They are consistently better than any of the others I have been privileged to read.—Galen E. Andrews, Barnes Drill Co., Rockford, Ill.

Needs Direction

Sir—In your Nov. 17 issue on p. 15 you mention a new die steel for upset forging dies ("Die Steel Gains Strength") which has been developed. Will you please let me know where we can write to get further information on this. — George C. Price, president, Oliver Electrical Manufacturing Co., Battle Creek, Mich.

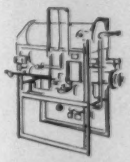
■ **Write to Heppenstall Co., 4620 Hatfield St., Pittsburgh 1, Pa.—Ed.**

"Willoughby, how would you like an exclusive territory?"

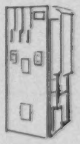
WILLIAM C. DIMAN,
Atmosphere Equipment Specialist, reports . . .

MODERN METALS DEMAND MODERN ATMOSPHERES

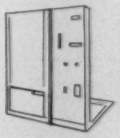
Ever since 1927, when Hayes perfected the first controlled-atmosphere furnace, we have made a steady effort to further the technology of protective atmosphere heat treating. By recommending proper atmosphere equipment, we have helped customers increase production, obtain uniform product quality, and save processing time and trouble. Today, our atmosphere generator line, probably the most comprehensive in the business, includes:



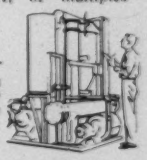
Exothermic Generators . . . for oxidizing or medium-reducing type atmospheres. Standard sizes from 200 CFH to 50,000 CFH.



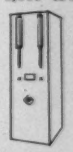
Endothermic Generators — for reducing and carbon potential atmospheres. Standard sizes from 100 CFH to 20,000 CFH.



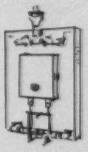
Ammonia Dissociators — for producing hydrogen-nitrogen atmospheres of high purity and low dew point. Standard sizes to 5,000 CFH, or multiples thereof.



Nitrogen Generators — for 99.99% pure inert gas at less than 20¢ per 1,000 cu. ft. Standard sizes from 1,000 CFH to 10,000 CFH.



Forming Gas Generators — for producing controlled ratios of nitrogen and hydrogen from dissociated ammonia. Standard sizes 500 CFH, 1,000 CFH, and larger upon request.



Molecu-Dryer (with LINDE'S Molecular Sieves) — for drying, sweetening, purifying protective atmospheres down to dew points of minus 100° F. Standard sizes from 250 CFH to 6,000 CFH and larger on request.

Hayes offers more than just equipment. Our engineering organization and experimental lab are ready to help make sure you get a "Results Guaranteed" solution to your heat treating or protective atmosphere problem. Write for descriptive bulletins.

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It pays to see HAYES for metallurgical guidance, laboratory facilities, furnaces, atmosphere generators, gas and fluid dryers.

COMING EXHIBITS

Plant Maintenance & Engineering Show—Jan. 23-26, International Amphitheatre, Chicago. (Clapp & Poliak, Inc., 341 Madison Ave., New York 17.)

International Heating & Air-Conditioning Show—Feb. 13-16, International Amphitheatre, Chicago. (International Exposition Co., 480 Lexington Ave., New York 17.)

MHI Pacific Coast Show—Feb. 22-24, Cow Palace, San Francisco. (Material Handling Institute, Inc., One Gateway Center, Pittsburgh 22.)

Western Metal Show—March 20-24, Pan Pacific Auditorium, Los Angeles. (American Society for Metals, Metals Park, Novelty, O.)

MEETINGS

JANUARY

The Institute of Scrap Iron & Steel, Inc.—Annual convention, Jan. 8-11, Hotels Fontainebleau and Eden Roc, Miami Beach, Fla. Institute headquarters, 1729 H St., N. W., Washington 6, D. C.

Aluminum Window Mfrs. Assn.—Annual meeting, Jan. 9-12, Emerald Beach Hotel, Nassau, Bahamas, Association headquarters, 630 Third Ave., New York.

Society of Automotive Engineers, Inc.—Annual meeting, Jan. 9-13, Cobo Hall and Convention Arena, Detroit. Society headquarters, 485 Lexington Ave., New York, N. Y.

Hoist Manufacturers Assn., Inc.—Annual meeting, Jan. 10, Statler Hotel, Cleveland. Association headquarters, One Thomas Circle, Washington.

Steel Shipping Container Institute, Inc.—Winter meeting, Jan. 17-18, St. Regis Hotel, New York. Institute headquarters, 600 Fifth Ave., New York.

Steel Plate Fabricators Assn.—Annual meeting, Jan. 18-20, Logo Mar Hotel, Fort Lauderdale, Fla. Association headquarters, 105 W. Madison St., Chicago.

Industrial Heating Equipment Assn., Inc.—Annual winter meeting, Jan. 23-24, Dearborn, Mich. Association headquarters, 2000 K St., N. W., Washington, D. C.

Instrument Society of America—Annual meeting, Jan. 23-25, Hotel Astor, New York. Society headquarters, 313—6th Ave., Pittsburgh.

Society of Plastic Engineers, Inc.—Annual technical meeting, Jan. 24-27, Shoreham & Park Sheraton, Washington, D. C. Society headquarters, 65 Prospect St., Stamford, Conn.

National Tool & Die Manufacturers Assn.—Winter board meeting, Jan. 24-28, Biltmore Hotel, Palm Beach, Fla. Association headquarters, 907 Public Square Bldg., Cleveland.

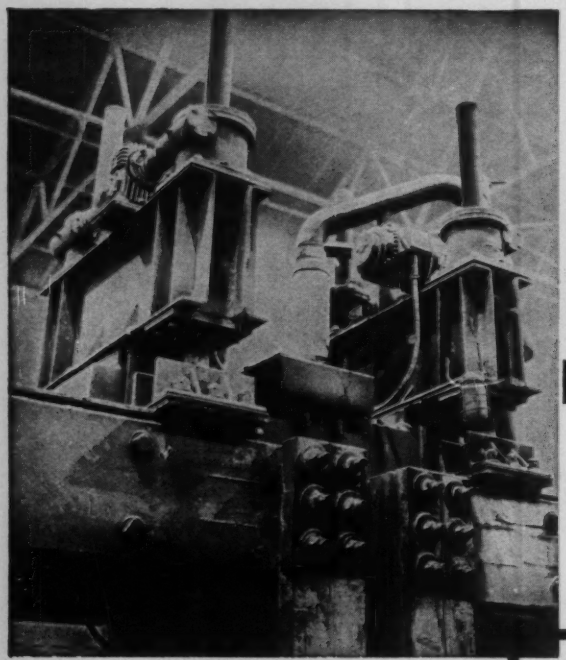
Metal Lath Manufacturers Assn.—Meeting, Jan. 25-26, Pick-Carter Hotel, Cleveland, Association headquarters, Engineers Bldg., Cleveland.

Cutting Tool Manufactures Assn.—Annual business meeting, Jan. 26, Harmonie Club, Detroit. Association headquarters, 1216 Penobscot Bldg., Detroit.

National Assn. of Secondary Material Industries, Inc.—Midwestern Div. regional meeting, Jan. 26, Statler-Hilton Hotel, Detroit. Association headquarters, 271 Madison Ave., New York.

Truck-Trailer Manufacturers Assn., Inc.—Annual convention, Jan. 29-Feb. 1, Hollywood Beach Hotel, Hollywood, Fla. Association headquarters, 710 Albee Bldg., Washington, D. C.

Steel Kitchen Cabinet Manufacturers Assn.—Midyear meeting, Jan. 31, Sheraton Towers Hotel, Chicago. Association headquarters, 910 Park Bldg., Cleveland.



100 million pounds per year

That's how much aluminum a modern reduction plant equipped with 1000 Cone-Drive **double-enveloping worm** gearmotors produces. Gearmotors control anodes and casings on the electric furnaces. Ambient temperatures to 300° F and constant reversing are encountered.

Versatile Cone-Drive gearing is available in gearsets, speed reducers and gearmotors.

CONE-DRIVE GEARS

DIVISION MICHIGAN TOOL CO.
7171 E. McNichols Rd., Detroit 12

The Light Touch

Once a year—around the end of December — Minneapolis-Honeywell Regulator Co. brightens our mail with its new calendar.

This year is no exception. The calendar for 1961 just came in, and despite heavy work schedules, our editors spent a few minutes looking it over.

Fun With Industry—If you've never received a copy, you've missed something. Each month is illustrated by a cartoon poking fun at such modern marvels as automation, miniaturization, electronic "brains," missiles, and scientific research. (You'll find one reproduced below.)

Creator of the satirical color cartoons, which started in 1938, is William C. Eddy, founder and president of Television Associates, Inc., Michigan City, Ind.

A Fast Pace

Much to our chagrin, we have had a recurring error lately. Our editors keep referring to next year as 1960. Most of the time, this is caught by our copy readers. But it has crept into the published magazine.

Our only apology is that 1960 has gone by so fast (it has been a very busy and rewarding year for us), that we just haven't gotten used to 1960. And already 1961 is almost upon us.

Music Via Computer

Programmers at General Electric Co.'s Computer Dept., Phoenix, Ariz., have come up with a new holiday wrinkle. It's carols played on a million-dollar computer.

The music, sounding like that on a clarinet or single pipe organ, is produced by varying voltages from one level to another and back again. Any song within a four-octave range may be transcribed into computer language and punched on paper.

The result: Holiday carols in 210 time (via the GE 210 computer), accompanied by blinking lights, spinning tape reels, and clicking typewriters.

SPACE AGE HUMOR: Caption on cartoon from Minneapolis-Honeywell calendar reads: "Now he can't remember where he put his notes on the 'memory unit.' " It's one of twelve featured in the calendar.

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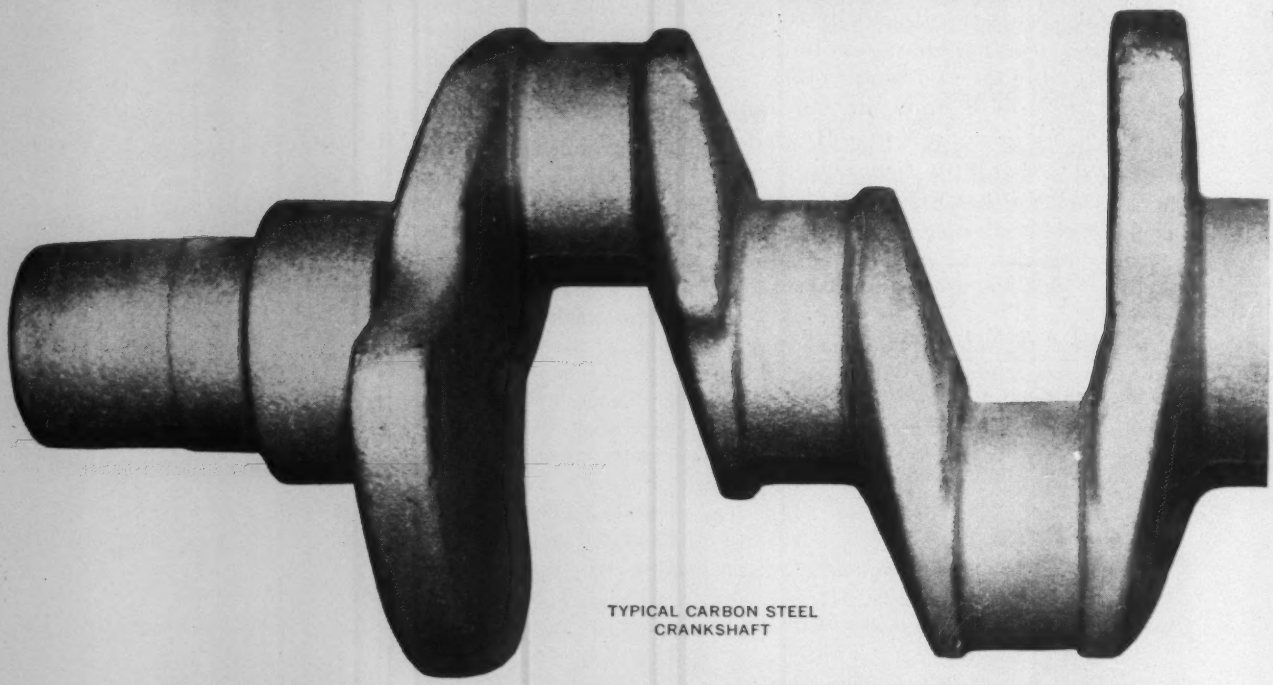

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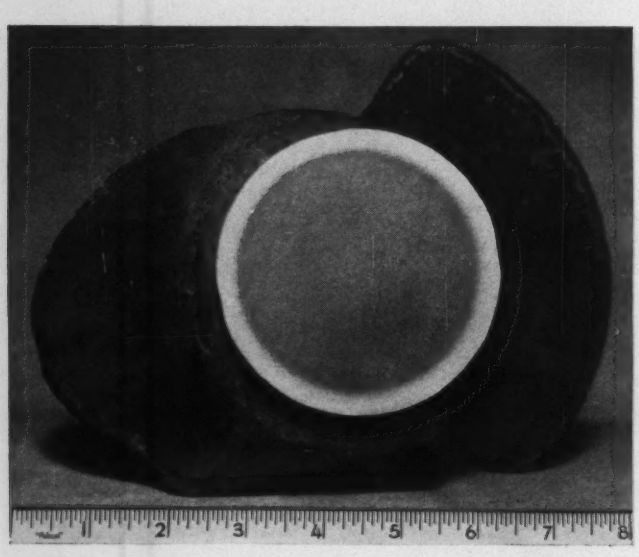

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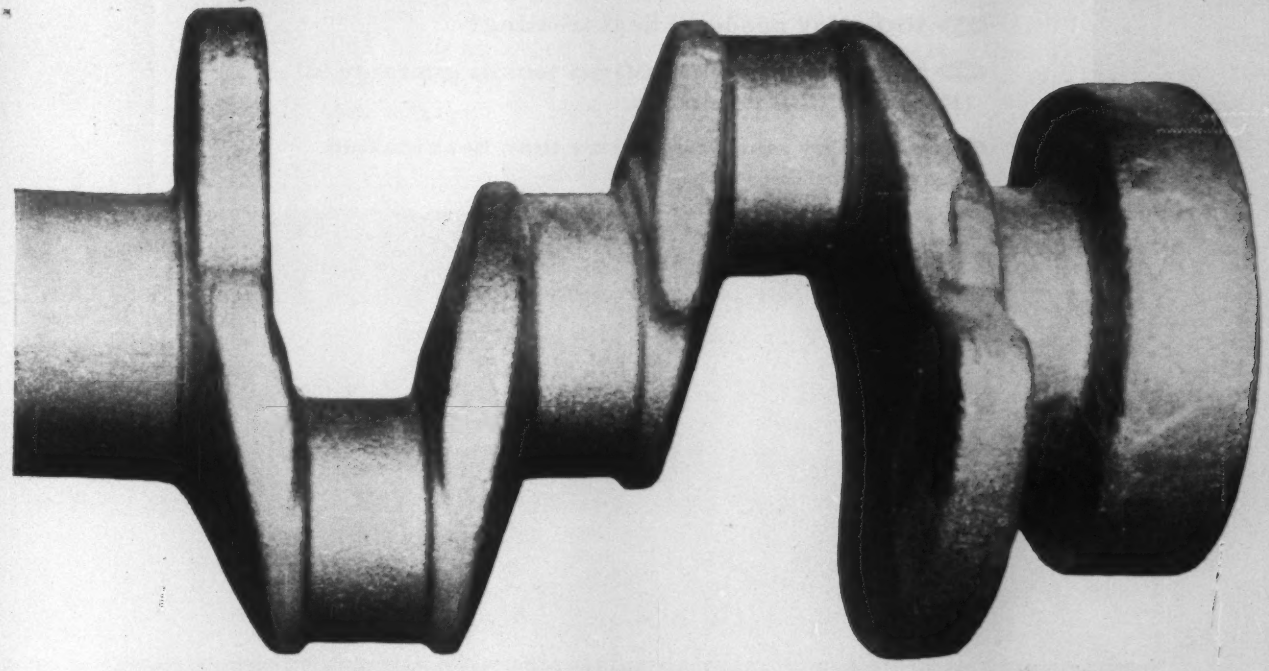

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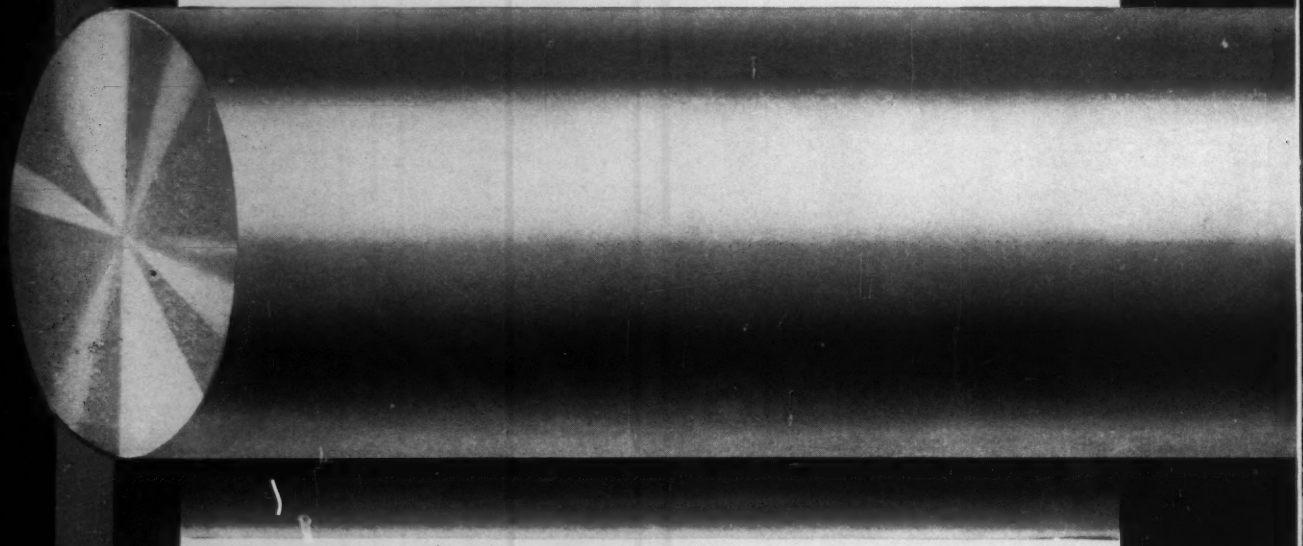

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Metalworking Newsfront 6

TOUGHER COMPETITION IN AUTO SALES RACE is promised by Studebaker-Packard Corp. The recent sales and marketing executive shuffle is designed to acquire new dealers and to persuade dealers with several auto lines to concentrate on S-P products. Dealers will also be aided in getting adequate credit lines from banks. And in the wind is a "compact compact" for possible 1962 entry.

ONE INDUSTRY THAT GOES UP AND UP, even in the face of generally declining business, is the electric utility group. Investor-owned companies reached an electric energy output of 764.8 billion kwh in 1960, 6 pct over 1959. The industry's construction expenditures were $3.35 billion, 9.5 pct of such expenditures made by U.S. industry for the year.

A LIVELY MARKET IN METAL CANS is pushed in the soft drink field. Shipments of metal cans for soft drinks jumped 59.8 pct in the first 10 months of 1960 compared to the same period last year. About 66,000 tons of steel were used in the first 10 months this year by canners of soft drinks.

SALES OF HOUSEHOLD APPLIANCES in 1960 amounted to $4.9 billion, 10 pct less than in 1959. A Commerce Dept. analysis shows that only two appliance items scored sales gains; dehumidifiers, up 15 pct, and dishwashers, up 10 pct.

MAKERS OF ANTI-SMOG MUFFLERS are readying their entries in the California certification stakes. The State Pollution Control Board will test exhaust control devices in February. One recent entry, made of stainless steel, will sell for $65 for foreign cars and compacts to $95 for standard-size cars. Servicing catalyst replacement will run $6 to $12 a year.

INDUSTRIAL PRODUCTS LEAD SALES RISE IN ELECTRONICS. The industry expects to reach an all-time high in factory sales of $9.75 billion in 1960, six pct over 1959. While military products account for the biggest sales chunk ($5 billion), industrial products, with $1.75 billion sales, were up 9 pct over 1959.

MARKETING INTEGRITY IS BEING AFFIRMED by a group of electrical equipment manufacturers. The companies voluntarily joined to determine if any damage was incurred by electric power companies as a result of alleged violations of the anti-trust laws.

Allison-Campbell

ABRASIVE CUTTING KNOW-HOW

This 12-inch billet was cut in 14 minutes!

This speed is standard procedure with CAMPBELL wet abrasive cutting machines. The 14-minute example refers to a semi-finished carbon steel billet, but it's just as true for other metals. Even Rene 41 and Inconel X can be cut at 7 to 10 square inches per minute.

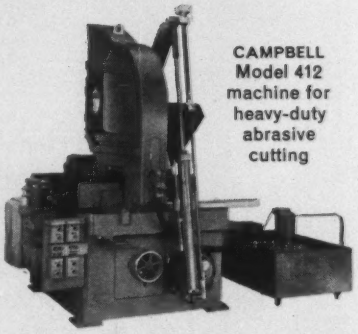
You get top quality, too • No burn, a surface suitable for metallurgical examination, and dimensional accuracy with modern abrasive cutting techniques.

The most economical way to cut • It's not uncommon to reduce cutting time from hours to mere minutes with CAMPBELL machines. Wheel cost is low, too.

Machines for heavy-duty jobs • ALLISON-CAMPBELL offers a wide selection of precision abrasive cutting machines. For the *big* jobs, the recommendation usually is either the CAMPBELL Model 481, with capacity up to 8″ squares, or the CAMPBELL Model 412, which can cut 12″ squares. Both of these machines have a unique coolant system for greater accuracy, better-quality cuts. Oscillation (the backward and forward motion of the wheel as it cuts through the work), speeds up production, increases wheel life.

For other cut-off jobs, there are four types of CAMPBELL machines in both wet and dry cutting models, with capacities and speeds to suit your own production needs. ALLISON-CAMPBELL also can supply the right wheels for any cut-off job.

Write for details. *For on-the-spot help, call in your* ALLISON-CAMPBELL *field engineer. He's an abrasive cutting specialist, ready to give expert advice.*



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Revitalized World Steel Industry Challenges U. S. Steelmakers

New equipment and new attitudes abroad press a challenge to American steelmakers.

Overseas production is gaining. So is efficiency. Equally important is the adoption of American attitudes to marketing and production.
By G. J. McManus

■ For domestic steel mills, the one-world concept has arrived.

American producers learned in 1960 they are now part of a global steel community. The old distinctions of technology, practice, and outlook are gone. A new day has dawned for the Old World.

Full impact of the change was driven home this year when top steel executives spent their time bumping into each other in the mills and markets of the world.

The touring groups saw that overseas mills are pushing to make more and better steel.

What's Going On—They learned that foreign producers are keenly aware of a world fight for markets. They got a close-up look at the new determination to match the quality and efficiency of American steelmaking.

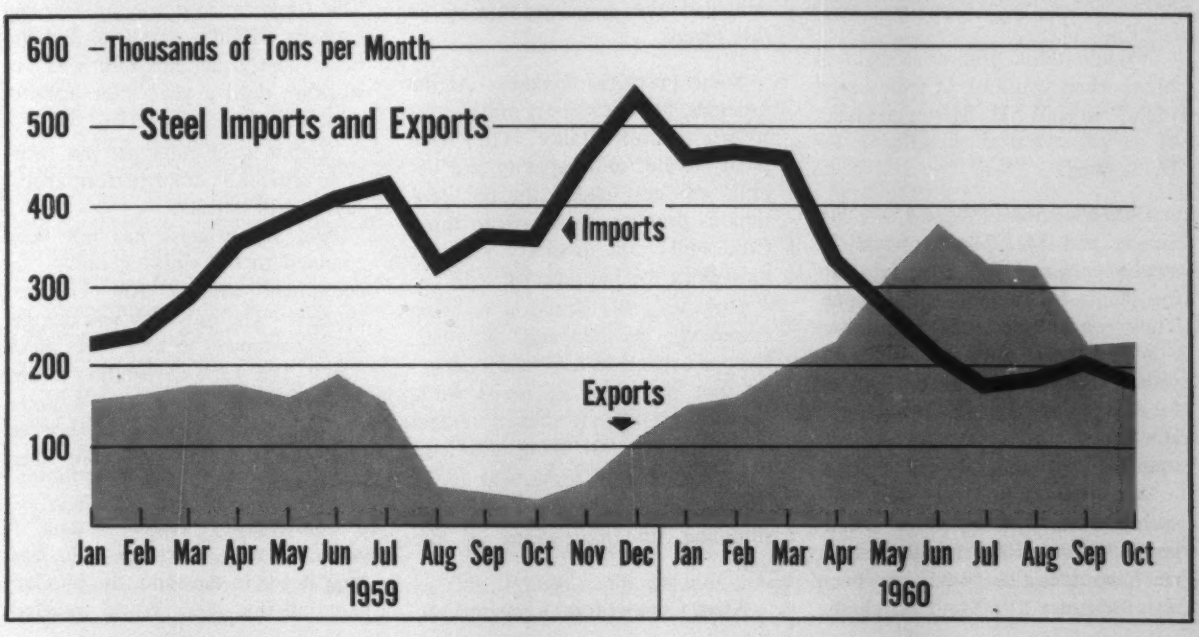
These truths did not come as a complete surprise. From statistics and the reports of specialists, domestic steel men have known there was growth and progress abroad. World steel production in 1960 is estimated at 377 million tons. Foreign plants will account for about 277 million tons of this.

Progress Report—In 1957, Europe produced 157.7 million tons of steel. The continent can make nearly 200 million tons today and is expected to add 58 million tons to capacity in the next five years.

Japan made 12.5 million tons in 1957; the Japanese will produce more than 20 million tons in 1960 and are planning for 45 million tons by 1970.

Equally well known is the fact that foreign expansion has involved the latest equipment. Post-war rebuilding programs have provided the big push for world steel and

No Easy Job to Hold Export Bulge



FOR WORLD MARKETS: Machined rods at Demka steelworks in Utrecht, in the Netherlands, are stacked for shipment. New methods and latest equipment in operations abroad are changing the world steel map.

much of the foreign capacity is relatively new.

The Reaction—Nevertheless, actual visits abroad have provided some real eye-openers.

"Everywhere we went, they wanted to know the latest production record at Fairless," says R. W. Simon, chief metallurgical engineer, operations, United States Steel Corp.

"You'd think you were right at home when you look at their newer mills," says W. H. Mayo, manager of process control metallurgy for U. S. Steel.

Cold-Finished Progress — Mr. Simon and Mr. Mayo toured 13 steel plants and five auto fabricating plants in England and Europe. They concentrated on the production and use of deep drawing cold-rolled sheet. They were checking for quality and deep-drawing sheet is a "good barometer of good steelmaking."

What they found was not reassuring from a competitive standpoint. Of seven sheet mills visited, all have facilities that have been installed since 1950 and match the most modern in this country. No Bessemer steel is being used for sheet; openhearths or basic oxygen vessels were employed at the mills visited.

In the matter of surface, these mills are now matching American quality. They are approaching American standards on drawing quality but they have not yet achieved the same uniformity in this regard.

Some Problems Remain—At the moment, Europe's sheet mills suffer from a lack of balance. They have plenty of hot mill capacity and hot mills are not loaded for the continuous practice of American lines. Cold mills and auxiliary facilities have been the bottlenecks.

However, this situation is being remedied. By the end of 1962, Europe expects to have sheet capacity that will meet its needs while operating at 70 pct. (Seven tandem cold mills are now being installed.)

"We sure saw some real tough competition," says Mr. Simon in summing up impressions of the tour.

Alert Competitors—The seriousness of this competition is more than a matter of equipment. The touring steel men found alert, aggressive spirit everywhere they went. Plant posters reminded workers they were competing with mills in other countries. In one plant, the big sheet mills of the world were all listed by name.

This cosmopolitan outlook is backed by skills and knowledge. In Italy, the touring team found openhearth men using the steelmaking slang of Youngstown and Gary. Workers trained over the years in this country are entirely hep to American practice.

American-Type Attitude—Finally, Europe has gotten away from the secretive isolationism that once marked its steel industry. Information, as well as steel, is moving back and forth across borders.

In short, foreign workers and foreign management have become infected with American hustle. They are driving to compete on production and sales in the world market. At the same time, some say, the domestic industry has been slipping into a narrow, confining groove.

U. S. in a Rut—As an example, an equipment man tells of shipping identical rolling mills to a Japanese company and an American plant. The Japanese unit was up to rated capacity within a month of installation. The American mill was not working right a year after installation.

"Labor wage rates are not nearly so critical as labor performance," says a mill builder.

And sluggishness has not been confined to the working ranks, say equipment men. An engineer charges: "The only way you can get an improvement in here is to sneak it in." The war's devastation forced modernization on Europe's mills, say suppliers; they were shocked into new thinking and then liked the taste of it.

Complacency Fades—But if it was ever true American mills had their heads in the sand, the blinders came off this year. World travelers

included the heads of U. S. Steel; Pittsburgh Steel Co.; Crucible Steel Co. of America; Allegheny Ludlum Steel Corp. Jones & Laughlin Steel Corp. had one team in Europe.

One reason for the visits was to take a closer look at competition. Possibly more important, domestic mills were checking foreign markets. In the first half of this year, only the United States among major steel nations showed a production drop from last year.

Business Outlook Abroad—In a year when demand for steel slumped badly in this country, booming conditions abroad kept foreign producers operating at peak levels. There are signs now of a slowdown overseas but long-term projections are optimistic.

A United Nations forecast sees steel consumption in Western Europe topping 150 million tons by 1975.

Moves Overseas — These numbers have American mills searching for new ways to share in the world market. Crucible Steel and Allegheny Ludlum have announced specialty steel operations for Europe. Crucible is starting a specialty warehouse in Australia.

Rheem Manufacturing Co. is establishing an Italian subsidiary to make welded steel tubes. H. K. Porter Co. has steelmaking facilities as part of a French fabricating plant.

Youngstown Sheet & Tube Co. is considering participation in an integrated mill proposed for Belgium. There has been speculation that others might be interested in construction of this type.

However, the cost and size of a modern integrated mill make producers stop to think. An economical operation would require 2 million tons and would cost up to $600 million, says Avery C. Adams, J&L board chairman. Mr. Adams doubts that any American company is ready for this kind of plunge.

More likely, perhaps, are arrangements involving financial participation or licensing contracts for Europe.

Republic's C.M. White Yields the Reins

Colorful, outspoken Charles M. White retires. Thomas Patton becomes chief executive.

Trend is to non-operating men in the top steel industry jobs.

▪ Some kind of a millenium has been reached in the steel industry. Charles M. White, the hard-headed and straight-shooting chairman of the board of Republic Steel Corp. has retired.

In his place as chief executive officer and retaining his job as president is Thomas F. Patton, soft-spoken diplomat, but basically as hard-headed as Charlie White.

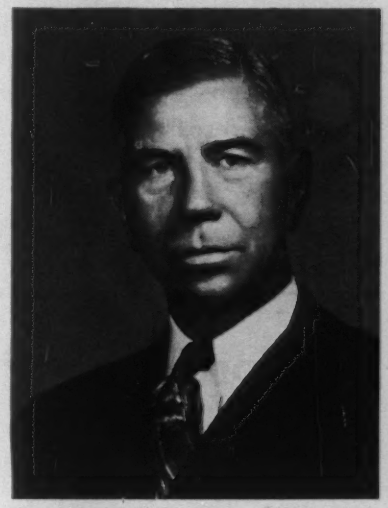
A Respected Man — Mr. White has been around the steel industry so long and is so well known that it is gratuitous to dwell on the fact. Everyone loves Charlie, including David McDonald and his union cronies. This despite the fact that Mr. White would knock them off with bargaining and other tools at any chance he had.

One union fellow has said to The IRON AGE, "Sure Charlie is a tough bird. Sure he will knock us on our bottom if he gets a chance. But he sure tells us just exactly what he thinks. That's what we like about him."

Partisan for Steel — Amen, say other steel people who have always been able to get Mr. White to back anything that was good for the industry. But the industry won't be quite the same without Charlie. Of course, he will be honorary chairman and a consultant, but that means he will keep out of the hair of the man he slated to take over for him—Tom Patton.

Mr. Patton's soft manner could put you off the beam. That is if you were to assume that he would be a pushover. He isn't. His training, to be sure, has been legal. But he has been president of Republic since 1956.

Good Teacher — Probably the best thing that is working for Tom Patton is the cold fact that he has been under the tutelage of Charlie White for years. They operated as complements to each other. They had to. There could never be two Charlie Whites.



WHITE: He's stepping down.

The appointment of Mr. Patton to chief executive officer expands the trend in the industry to have non-operating men at the top—with the edge in the big three going to lawyers: Roger M. Blough at U. S. Steel and now Tom Patton at Republic. Bethlehem's Arthur B. Homer was formerly a shipbuilder. There are still some old timers left in steel, but they are giving up the reins to the new type management team groups. This trend will probably be hastened by Mr. White's retirement.—**Tom Campbell.**

Will Partners Succeed Goldberg?

Associates Are Seasoned Labor Lawyers

New Secretary of Labor will be followed as chief counsel for Steelworkers by his law firm partners.

Although not as well known as Mr. Goldberg, they are capable men and well-schooled in labor problems.
By Tom Campbell

▪ Now that Arthur J. Goldberg—one of the brains of the United Steelworkers—will be in government, who will fill his place as special counsel and negotiator?

This is a big question. But the answer isn't hard to find. David McDonald, USWA chief will take on—or continue—the services of Mr. Goldberg's chief (and knowledgeable) partners.

Know the Ropes—The new Secretary of Labor-to-be had a great habit of talking over, working over, and checking over his projects with his partners David Feller and Elliot Bredhoff. They have had his unqualified confidence since the day they both went to work with him in 1949. And he has had theirs in return.

Of the two, Dave Feller is probably the extrovert and Elliot Bredhoff is the introvert, although both can change public character easily. But generally Dave is more vocal than Elliot.

Ivy League — Mr. Feller is a Harvard Law School graduate and has also been in practice on other than labor matters. He was chief clerk for the late Chief Justice Vinson. Besides that, since 1949 he has been in and out of some of the most vociferous steel and other union hassles. So, there is no question of his savvy. He is quite blunt in some of his off the cuff remarks, but is by no means a complex personality.

Probably best remembered is his priceless remark made at the height of Mr. Conrad Cooper's offer, implied as a concession, to arbitrate a long and involved legal point. In the heat of the impact Dave said something like this: "We were against it before we heard it." The final rejection supported this intuition.

But Mr. Feller has learned much in his own way and has absorbed much from his mentor, Arthur Goldberg. He also gets along great with Dave McDonald and Dave's staff—at all levels of the organization.

The Other Partner—Turning to Elliot Bredhoff: A Yale law school man, he is a perfect complement to Mr. Feller. The two get along like the Gold Dust Twins. They both know Mr. Goldberg's foibles, his strengths, and his way of looking at things. Elliot is a little more restrained than Dave Feller. But his punch and his dagger are just as sharp.

All in all, Mr. McDonald will miss his thinker, chief counsel Goldberg. But if he had to start over again and try to replace him, he has it made with Feller and Bredhoff.

The official picking of Mr. Goldberg's firm—which he leaves entirely when he goes into government—by Mr. McDonald et al will come along in the near future after the details are worked out.

McDonald for President: USWA

Dave McDonald will be a shoo-in for president of the United Steelworkers at the union election early next year. The rebels, led by Donald C. Rarick, have about given up.

This whole thing bears a resemblance to what happened back in 1937 when an independent union tried to buck the old Steel Workers Organizing Committee. Then, there was great enthusiasm, as long as expenses were being paid to attend meetings.

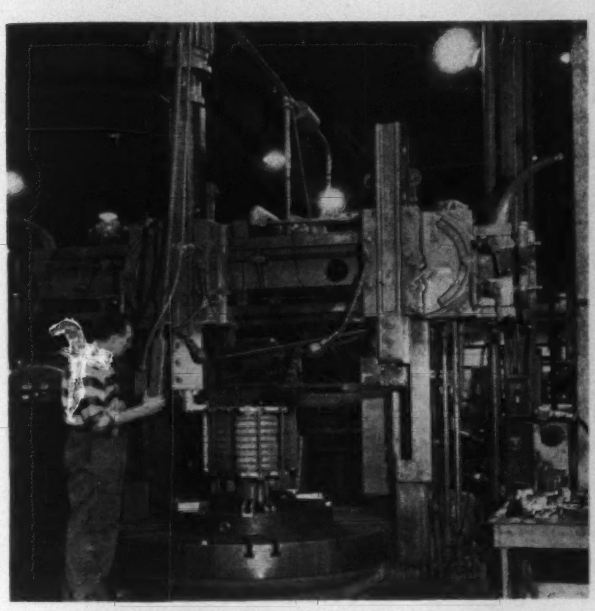
No Support—Later, the leaders told The IRON AGE that with all the shouting, the support — and money—was nil. With that statement, the independent union closed up shop in Pittsburgh.

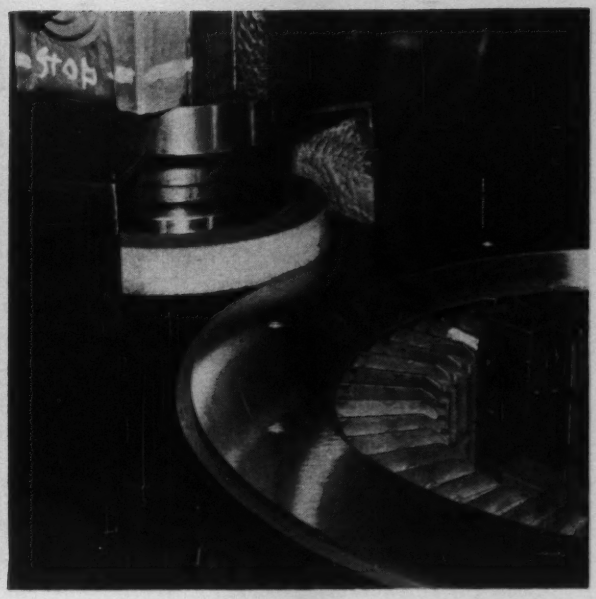
It never was as great a threat to the Steelworkers, as the rank and filers were to Dave McDonald a few years ago when Don Rarick polled a third of the votes. What started out then as a protest against a raise of dues from $3 to $5 a month, and a protest against Mr. McDonald's pay raise, is now a memory and a slight hang-on of the dwindling opposition to McDonald & Co.

It is all over but the voting.

What Effect? — Some sources claim that Dave McDonald will be softer with the steel management because of the demise of the rebels —who demanded that the steel companies give much more than was obtained by the union chief.

This is whistling in the dark. Mr. McDonald knows only one way to operate with the steel management: Demand and fight for an improvement in wages and fringe. That is what he will do next time.





GRINDING AWAY: Many boring mill builders are finding that their machines can be made more versatile by adapting them to grinding operations through the addition of grinding spindles as original equipment.

Boring Mills Can Be Versatile

Recessions often spur industries to innovation. Boring mill builders are no exception.

Many builders now offer grinding spindles as optional, original equipment on machines. By T. M. Rohan

■ For years, boring mill builders felt their machine tools should never mix with grinding wheels.

Although many users added grinding spindles to boring mills, builders felt it was better to keep the two as far apart as possible. It was their contention that an association of the two could only lead to grit in the bearings.

Crisis Changes—It took a sales crisis to change things. When machine tool orders collapsed in 1956 and 1957, builders cast around for added sales features. Along with some nudging from customers, it led to a trend toward furnishing grinding spindles as original equipment on boring mills.

Now, one large boring mill builder estimates about 10 pct of its new mills are factory equipped with grinding spindles. Others have similar ratios. And it has become a big item for accessory builders.

Users are now machining and grinding on the same mill with a single setup—at a savings of $40,000 to $80,000 for a grinding machine often not necessary for standard jobs.

On work too big for a horizontal lathe, like large bearing races, the cutting and grinding combination mill is admirably suited. Tracer contouring and grinding is another common job well suited to this.

The major and pioneer grinding spindle manufacturer, Standard Electrical Tool Co. Cincinnati, regularly equips large mills for many manufacturers, as have other major spindle manufacturers.

Precision Finishes—"In the last two years our grinding spindle business has increased over 50 pct in the face of a falling market," says V. R. Lagaly, Standard Electrical's sales manager. "It has become the biggest phase of our business.

"About half are original equipment jobs and half conversions of existing units. We have made spindles up to 198 in. long. They will give precision finishes within the limits of the mill they are on.

"Prices range to about $7000 for standard jobs. The units can also frequently be used on tool holders on vertical turret lathes and have integral motors, of course.

New Work—"We are constantly getting into new types of work. Our most sophisticated so far is a special ram conversion for electrolytic grinding of super-alloy material where regular grinding was too slow," Mr. Lagaly says.

"The unit has a direct current power pack which delivers up to 3000 amps. A non-corrosive salt solution is used like coolant and charged with electric current making it electrolytic," he explains.

Britain's Steel Union: No Strike in 50 Years

Report on Europe

This is the seventh of a series of on-the-spot reports by G. F. Sullivan, editor of The IRON AGE, who recently completed his sixth peacetime visit to Europe.

■ Expose a British steelworker to the current U. S. talk about closer labor-management relations and he'd probably laugh. His union officials wonder what all the shouting is about: They've been on good terms with management for years.

The British steelworkers' union hasn't pulled an official strike in 50 years. (There have been wildcats and strikes by other unions that hit the steel industry). You can count on your fingers the cases that have gone to arbitration since 1917.

No "Pattern"—Wage rates are set locally. The only national rate in the heavy steel industry is that for melters.

And yet, in relation to pay scales in other British industries, the British steelworker is about as well off as is the American.

Amazing Record — How has this record of labor peace been attained? Is there a lesson here for labor relations in the United States?

For the answer we went to Swinton House in London, headquarters of the Iron & Steel Trades Confederation, for a talk with D. H. Davies. This quiet, pipe-smoking, stockily-built Welshman is assistant general secretary of the confederation.

The reasons he gave are simple:

(1) Type of negotiating machinery;

(2) Firm belief in the sanctity of agreements;

(3) Mutual respect.

The casual observer may give much of the credit for good relations to the fact that trade unionism is older in Great Britain than it is in the U. S.—hence more mature. But since few other major British unions have a record like the steelworkers, this argument has no basis in fact.

Similar to USWA—The Iron & Steel Trades Confederation is an industrial union. It includes every section of—and most workers in—the industry, including clerical people.

Local Setup—The members of the Confederation are organized in branches connected with the plants where they work. At a small plant the members may all be in one branch; at large integrated plants there are a number of separate branches.

The branches are divided into seven geographical areas (called Divisions), each with an office in the area. Each is supervised by a Divisional Officer whose job is to look after the interests of the members in his Division.

Supervision of the whole administration is from the Central Office in London. The governing body is the Executive Council of the Confederation.

Named in London—Each division has one or two permanent officers. They are elected by the Executive Council after personal interviews and examinations in such subjects as mathematics and current events.

Throughout the industry, the goal is to settle wages and working conditions at the lowest possible level. Usually, this is by having a local negotiating committee working with the local plant manager.

It's an Insult—As Mr. Davies puts it, "We consider it rather a bad thing if problems have to go to arbitration. Beyond the local works level we have branch people to try to settle grievances. Only a few get to the branch level; and very few indeed go beyond that to this central office."

Here is how grievances usually work in practice: Suppose plant management turns down an increase asked by a crane operator because a new furnace is added to the three he had been serving. A representative of the union's divisional office is called in to try to iron things out. He may recommend the increase or he may agree with the plant manager.

Third Step—If the craneman isn't satisfied he may ask referral to a neutral committee of union and management men. Their decision is usually final, but it can still be protested by either side. At this point it goes to arbitration—which is rare.

The following is from the rules of the Midland Iron and Steel Wages Board. It sums up in one long sentence a great deal of the reasons for labor peace in the British steel industry:

"The objects of the Board shall be to discuss and, if necessary, to arbitrate on wages or any other matter affecting the respective interests of the employers or operatives, and by conciliatory means to interpose its influence to prevent disputes and put an end to any that may arise."

Negotiations of a "national" nature are by a group representing employers and the union branches concerned. Only melters have a national wage rate.

Wages of other workers vary. Most are on piece or tonnage rates. Since 1940 they've had a cost-of-living bonus plan and several of the c-o-l raises have been consolidated into base rates.

Our National Goals—5

The Decades Ahead

Growth Rates: The 1970 Outlook

Changes in relative economic strengths of nations will shape the future course of U. S. international relations.

Both Free World and Communist Bloc nations will vie for the allegiance of underedeveloped countries.

By E. C. Beaudet

■ In the struggle between the Free World and Communistic-Bloc nations, economic growth may be as important as new weapons systems.

To back this up, William P. Bundy, staff director of the Commission on National Goals points to two major economic changes which have had a significant impact on international relations since the 1950's.

1. The rapid advance of economic growth rates in Russia and Red China.

2. The strong economic comeback of Western Europe and Japan.

What's Ahead—But what of the decades ahead? What further changes can be expected in the relative economic strengths of nations? And how will they affect the shaping of long-term U. S. goals and policies?

In assessing these questions, Mr. Bundy, on leave from the CIA's National Board of Estimates, draws heavily on estimates of world growth rates, gross national product and income per capita by responsible Administration officials. These estimates are shown on p. 32.

While forecasts of this nature cannot be precise, Mr. Bundy contends they can be used to draw certain conclusions about the future course of U. S. policies in the decades ahead.

Capacity Grows—First of all, in terms of gross national product and income per capita, the United States and other economically-advanced free nations will still be substantially ahead of the Sino-Soviet Bloc in 1970.

Even with a moderate growth rate of 4 pct a year, the U. S. gross national product will hit $700 billion by 1970; income per capita will average $2,600. Other advanced free nations will progress proportionately at similar rates.

This means they will continue to have the **capacity** for higher living standards, adequate defense and even greater assistance to the uncommitted and underdeveloped nations of the world.

Complications — To hold and gain the allegiance of less developed nations. Mr. Bundy says we must further their economic growth. This will call for a major outflow of men, material and techniques. But per-

National Goals Series

This is the fifth and final article based on the report of President Eisenhower's Commission on National Goals.

Others in the series include: The Overall Report, Dec. 1; Economic Growth, Dec. 8; Technological Change, Dec. 15; Foreign Trade Policy, Dec. 22.

The complete reports are published in a book entitled, "Goals for Americans."

haps the most important factor, he says, is the speed with which new methods must be adopted.

This problem is complicated by the rate at which underdeveloped nations are growing numerically. This affects the speed of their economic buildup in two ways:

1. A greater part of their economic expansion must go simply to maintain present living standards.
2. New labor-saving, efficient production methods will cause unemployment and dislocation of labor. Because of this they often cannot be applied fully, at least in a free society.

Sharpen Choice—These two differences make any comparison of growth rates between advanced and underdeveloped nations extremely difficult.

More importantly, they sharpen the choice of routes to faster growth between free methods and a higher standard of living; and forced methods which, for a time, can keep down human desires in the interest of future expansion.

Along with this problem, free nations must work to offset the effect of continuing growth by the Soviet Union and its European Satellites.

By 1970 Russian economic growth may increase by 70 pct and that of its European Satellites by 60 pct. The gross national product of both groups combined will run about $510 billion.

Solidify Gains — In this decade the Soviet Union will consolidate its economic gains of the 1950's. It will have the capacity to support a major military effort, further boost living standards and step up foreign economic activity.

True Differences—While the living standards of Russia and its European Satellites will improve dramatically, Mr. Bundy says showcase achievements of these groups should not obscure the difference in true living standards between these nations and the free world.

Communist China, Mr. Bundy reports, will show the most striking economic relative gains by 1970. Despite exaggerated claims, economic gains in the 1958-1959 period have been extremely high.

Further industrial expansion seems assured with forced investment running 30 to 40 pct of total output.

Ten-Year Growth—Communist China's growth rate over the next nine years is estimated to average 10 pct a year. Its gross national product may reach $180 billion.

While much lower than advanced free-world levels, this dramatic increase can't help but have an effect on underdeveloped nations.

Nations in the less advanced category will still be way behind at the end of the decade, Mr. Bundy claims. Estimates of their per capita income, below, show their continuing need for capital and point up their pivotal position in the struggle between the two powers.

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World Growth Rates Shape U. S. Policies

	1960 GNP, $ Billions	Increase 1960-1970, Pct	1970 GNP, $ Billions	1960 Income Per Capita, $	1970 Income Per Capita, $
Advanced Free Nations					
United States	$500	40 Pct	$700	$2,600	$3,300
Great Britain, France, W. Germany	175	40	250	1,200	1,600
Rest of Europe	125	40	175	650	850
Canada, Aus., New Zeal.	50	50	75	2,000	2,400
Japan	35	55	55	300	450
Sino-Soviet Bloc					
Soviet Union	225	70	380	1,000	1,500
European Satellites	80	60	130	800	1,200
Communist China	90	100	180	150	200
Other Free Nations					
Near East (incl. Egyptian part of UAR)	15	60	25	175	225
South Asia	40	60	65	75	100
Free Far East (ex. Japan)	25	70	45	100	130
Africa	30	70	50	135	175
Latin America	60	70	100	300	400

Note: Estimates based on 1958 U. S. dollars; Columns 3 and 5 subject to 25 pct variation.

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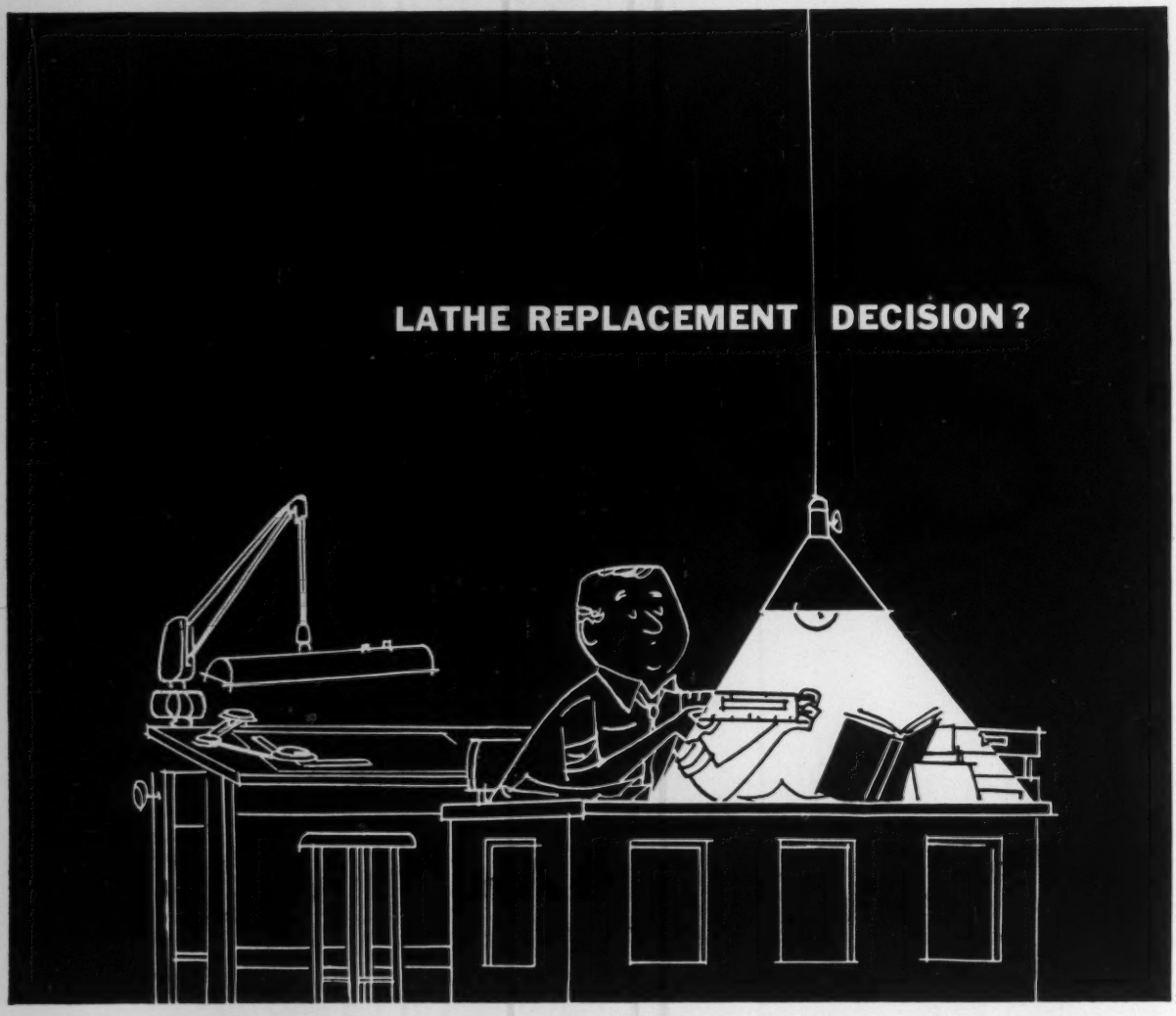

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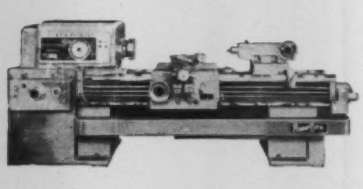

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COATESVILLE DECLARATION: President Eisenhower and Charles Lukens Huston, Jr., president of Lukens Steel Co., hold this declaration of Economic Freedoms during recent ceremonies at the White House.* Mr. Huston is representing his company, which conceived the idea.

Initial Production Starts—Facilities for opened-coil annealing of steel sheets for enameling suitable for one-coat vitreous porcelain applications are under construction at U. S. Steel Corp.'s Irvin Works. Dravosburg, Pa. Initial production on the facility began this month. It will increase to full capacity by mid-1961 as additional units are completed.

New Overseas Company—Crucible Steel Co. of America, through its wholly-owned subsidiary, World Crucible Ltd., has formed an Australian company, Crucible Steel Australia Pty. Ltd. It will distribute the full line of specialty steel products of Crucible Steel of Canada Ltd. and the U. S. company. An initial step has been undertaken by purchasing land in Bankstown, an industrial suburb of Sydney, Australia, for the immediate construction of a warehouse.

* Shown in the picture are (l to r): S. W. Antoville, chairman, U. S. Plywood Corp.; Dr. Merrill Watson, executive vice president, National Shoe Manufacturers Assn.; John H. Crider, Deputy Director of Information, Committee for Economic Development; President Eisenhower; Huston; Melvin H. Baker, chairman, National Gypsum Co.; William E. Blewett, Jr., president, Newport News Shipbuilding and Dry Dock Co.; Charles W. Adair, Jr., Deputy Assistant Secretary of State for Economic Affairs; and Mrs. Elizabeth M. Manning, president of Manning Public Relations, coordinator of the Coatesville Conference.

More Missile Vessels—Two new contracts for titanium pressure vessels, amounting to more than $850,000, have been awarded to the Airite Div., The Electrada Corp., by the Convair Astronautics Div. of the General Dynamics Corp. Deliveries of the vessels, to be used in the Atlas missile program, will begin immediately and the order will be completed by April 15, 1961.

New Branch Office — Carmet Div., Allegheny Ludlum Steel Corp., is forming a new nationwide sales organization to distribute Carmet cemented carbide products in the U. S. and Canada. These will be: Atlantic District, with headquarters in West Hartford, Conn.; Central District, with headquarters in Detroit; Midwest District, with headquarters in Chicago; and Pacific District, with headquarters in Los Angeles. Three district offices will be in operation by Jan. 3, and the Los Angeles office will be formed early in 1961.

EOCI Names Officers—W. W. Peattie, president, Northern Engineering Works, Detroit, was elected president, Electric Overhead Crane Institute, Inc., at its annual meeting held in the Carlton House, Pittsburgh, on Dec. 6. H. W. Gledhill, Jr., Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y., was elected vice president.

To Buy Plant—The Dow Metal Products Co., Div. of the Dow Chemical Co., has arranged to buy the plant of Sheet Aluminum Corp., Jackson, Mich. The purchase is expected to be concluded on Jan. 31, 1961. Sheet Aluminum Corp., a producer of rolled aluminum products, is a wholly-owned subsidiary of Mueller Brass Co., Port Huron, Mich.

A Continuous Line—A continuous annealing line is being constructed for heat-treating thin-rolled sheet steel for tin plate at U. S. Steel Corp.'s Irvin Works at West Mifflin, Pa. This annealing line will enable the Irvin Works to provide every type of tin plate product now required by can manufacturers.

Directory Ready—The third edition of a directory of military agencies responsible for development of missile ground support equipment has been compiled by the Dept. of Defense. It is for sale to the public by the Office of Technical Services, Business and Defense Services Administration, U. S. Dept. of Commerce, Washington 25, D. C.

For Liquid Hydrogen — Linde Co., Div. of Union Carbide Corp., will build a 26-ton-per-day liquid hydrogen plant at Fontana, Calif. The new plant will supply 21 tons of liquid hydrogen daily to the National Aeronautics & Space Administration under a $31 million contract just awarded to Linde.

A Headquarter Move—E. W. Bliss Co. plans to move its corporate administrative offices from Canton, O., to Pittsburgh, where they will be located in the new Number 4 Gateway Center Building. The move will be made early in March, 1961. It will not affect operations at the company's plant in Canton.

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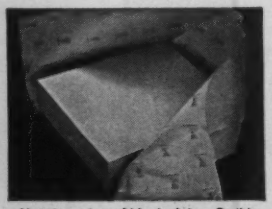
How to rustproof a freight car—Ferro-Pak is used to line sides of car and to interleave coils, transforming ordinary freight car into huge rustproof package.



How to rustproof black plate—On this light gauge, dry, uncoated steel, rust can start from a fingerprint. Ferro-Pak keeps black plate rust-free even when the humidity soars!

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How to Evaluate R&D Programs

With more money going into research and development, it's important to measure the results of this spending.

Finding a good method is difficult. But management should be doing a better job.

■ To stay on top competitively, you'll need to invest more in research and development. New products and new processes will be a business "must" for years to come.

But how does a manager measure the results of his R&D spending? How does he decide if he's getting maximum value from the funds spent?

Answering these questions is difficult. But in its Reporter, the Assn. of Consulting Management Engineers has come up with some sound suggestions.

The Manager's View—The very nature of research and development operations makes a neat solution impossible, says ACME. However, the only practical thing to do is make a compromise with reality.

It's important, the report adds, to decide on what level R&D is going to be evaluated. For each of three business levels evaluation has a different meaning.

A top manager, for example, wants to find out whether he's getting what he should out of his research program. He wants to know if he should expand or curtail it. And whether its results are satisfactory on the basis of quantity or quality.

. . . And the Scientist's—But the research director looks at R&D evaluation as a way of measuring progress on individual projects. Scientists regard evaluation as a means of proving out the results of an experiment, a segment of research, a material, or a reaction.

Studies show, the ACME says, that R&D is usually undermanaged to a great degree. Among companies who do formally evaluate R&D three methods are used. These are: (1) Measuring it primarily on a quantity basis; (2) measuring it on a quality basis; or (3) making a technical audit on R&D's efficiency and its integration into the company as a whole.

"Each method has something to be said for it," ACME points out, "but no one stands alone."

Why It's Difficult — There are many difficulties a manager faces in measuring the creative efforts of research. Some include: In contrast to selling, production or finance, he generally hasn't any background experience to guide him. It's difficult to pinpoint a project's ultimate end or worth. And it's hard deciding just what R&D includes.

Some Basic Rules—The basic idea in evaluating research is this, ACME says: Look at precisely what you are measuring. Determine what the particular project is really supposed to be doing. Decide what it can conceivably turn out, both directly and indirectly.

Then find benchmarks which come as close to assessing it as you can. Remember to study the question from the standpoint of your own particular company. Various companies have different ways of defining, using, and viewing R&D.

More Top Executives Needed

■ Industry will be hiring more top executives in '61 than at any time in U. S. history.

That's the conclusion of an annual general survey of business hiring conducted by Cadillac Associates, Inc., Chicago, executive search and placement organization.

Demand for top men will stay high despite the fact business conditions will trend toward the down side, at least through mid-year.

Where They're Wanted—Two of the "hottest" areas for executives in '61 will be in the chemical and electronics fields. Some of the reasons advanced for a 20 pct gain in demand for chemical executives: New plants, space industries, propulsion fuels, and the increasing field of miracle drugs.

The rosy prediction applies only to middle and upper income executives, Lon D. Barton, Cadillac's president points out. There is a great deal of softness for personnel in the lower middle and lower income brackets as competition for these jobs increases.

But demand for middle and upper level executives is high now and will grow even stronger in 1961, the survey concludes.

Automakers Still Like Copper

Research Is Aimed at Developing Tarnish-Free Trim

Other nonferrous metals have been grabbing the spotlight in recent months.

But automakers still find that copper and brass are best for a number of applications.
By A. E. Fleming

▪ Copper and brass still play a key role in a wide variety of auto parts.

To get an idea of where their product stands in 1961 cars, representatives of the Copper & Brass Research Assn., visited Detroit to talk to automotive metallurgists, design engineers and purchasing people.

They were told by many auto men that Detroit is interested in a stainless finish for copper and its alloys. Such a product is under study. If developed with proper strength and fabricating qualities, copper producers think it could furnish some new auto trim markets for copper.

50 Applications — Meanwhile, copper and brass still are used chiefly in radiators because of heat transfer and soldering demands. An average V-8 engine radiator core has about 19 lb of copper and its alloys. A six-cylinder has 14 lb.

But there are more than 50 other applications where copper and brass are used. A 1961 Plymouth four-door sedan, for example, has 3 lb of copper in the heater motor winding, 2.75 lb in the generator, 2.55 lb in the starter and 2.4 lb in the wiring harness and battery cable.

Where It's Used—American Motors Co.'s 1961 models use 23 lb of brass mill products per car, including 10 lb in the radiator and its components. Another 10 lb of copper wire goes into the ignition and electrical system.

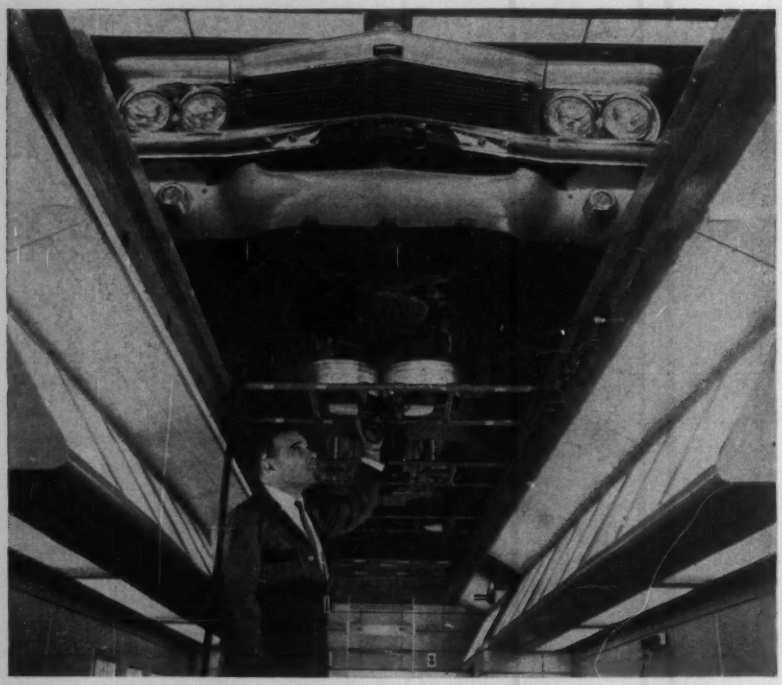
Ford Motor Co. gives these estimates of the amount of copper in its automobiles: Standard Ford, 34.28 lb; Mercury, 32.54 lb; Falcon and Comet, 23.23 lb; Lincoln, 38.10 lb; and Thunderbird, 33.61 lb. A 1961 Ford truck uses 25.96 lb and a tractor 21.79 lb.

By mill shapes, the 34.28 lb in a Ford averages out to 9.94 lb of wire, 2.42 lb of bar, 2.62 lb of sheet and 17.45 lb of strip. The rest includes 1.26 lb of sintered powder, 0.35 lb of anodes and 0.24 lb of castings.

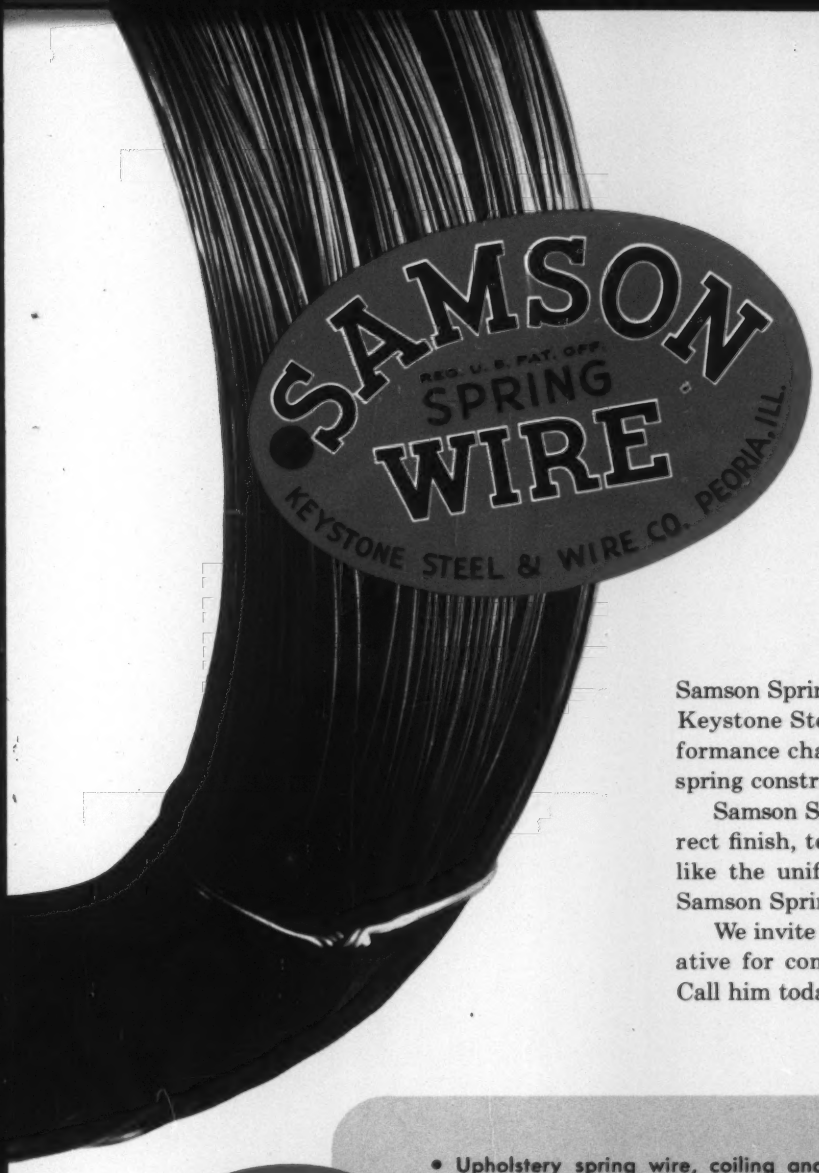
Back to Brass—A Ford department head told the CABRA visitors that Ford has gone back to brass for lamp sockets of its headlights and taillights "because steel corroded too easily."

Ford also is returning to copper battery cables because of reported joining difficulties encountered with aluminum. Also, printed circuits using copper foil are predominant in car radios and instrument panel clusters. Phosphorous bronze still is used in Ford switches.

There's No Traffic on Electronic Road



FREE WHEELING: The only red lights on Dodge's electronic highway are found among the 100 lights on the electronic brain that correlates engine and load conditions on test cars in the company's laboratory.



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Space Future Means Changes

Cost-Cutting Methods, Research Funds Needed

The future of the aerospace industry is one that will be highlighted by changes.

Lockheed Aircraft Corp.'s Courtlandt S. Gross says the industry must find ways to cut costs, promote research.
By R. R. Kay

▪ Dynamic changes in a dynamic business—that's the future of the aerospace industry.

What changes? Lockheed Aircraft Corp.'s president, Courtlandt S. Gross, puts them in these broad groups: (1) Changes in technology; (2) changes in government defense policy; and (3) changes in climate, both governmental and economic, in which the industry works.

In technology, look for continued developments, setting up challenges for metalworking.

There Are Problems—Mr. Gross points to a host of problems in the transition to the space age:

Far greater reliability, lower production runs, more emphasis on research, less spending on hardware, more money for technical studies, and a greater need for scientists and engineers.

New plants are needed while fairly new, but obsolete, buildings and equipment stand unused. And stiff competition is growing from large companies outside the aerospace industry.

Speaking to the Strategic Industries Assn., Mr. Gross gave Lockheed as an example of dynamic change. Five years ago, 94 pct of the company's business was in airplanes. Today, it's only 44 pct. Now, more than half of Lockheed's business is in missile and space work.

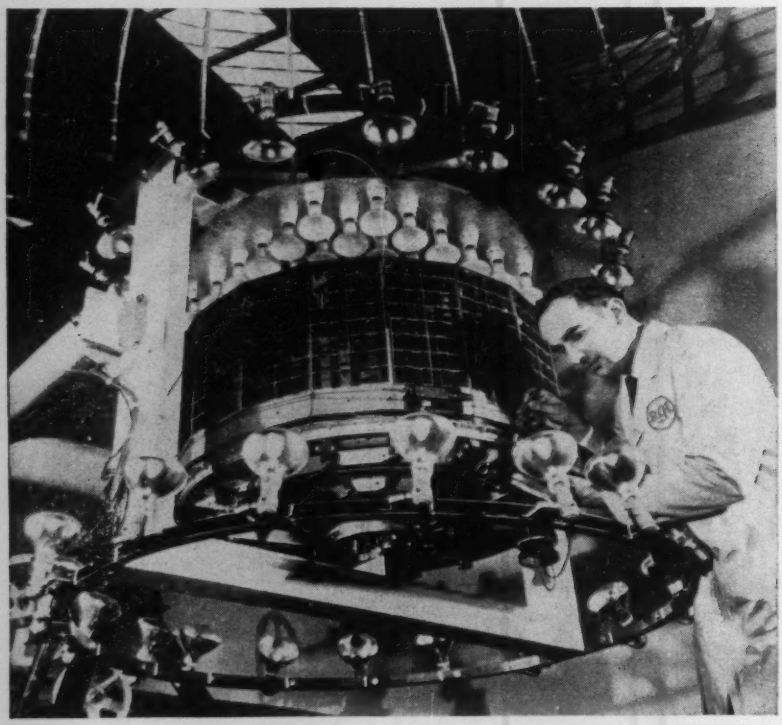
More Research—"The trend is toward more research, more testing, more developmental work on more exotic systems," says Mr. Gross.

"Five years ago, Lockheed had one employee in its engineering branches for every five employees in its manufacturing and related branches. Today, there are three engineering and technical employees for every five in its manufacturing departments."

Must Cut Costs — Changes in government defense policies are a sure thing. Both Congress and the military will aim for lower costs. Mr. Gross finds tighter control over costs "not only the ethical thing to do but obviously a good business practice that, in the long run, is the most profitable. The high cost producer, one way or another, will be weeded out."

One cost-cutting approach that paid off at Lockheed is quantity buying on some materials commonly used by all company divisions.

Photofloods Coat Tiros Solar Cells



TESTING PROJECT: Photofloods are used to test the 9260 solar cell battery of the Tiros II. The battery is supplied by International Rectifier Corp. A coating process gives cells indefinite life.

Automation Cuts Many Accidents

But It Doesn't Eliminate Them; And It Causes Others

There are now some answers to the questions of just how safe automated machinery is in use.

Generally, it reduces many of the common accidents, but it also creates some new hazards. By R. H. Eshelman

■ How safe are transfer lines and automatic machines? That question has intrigued many people and groups since metalworking industries began to go for automation on a plant-wide scale during the late 1950's.

Now there are some answers. Automation doesn't automatically eliminate safety problems, a National Safety Council expert has warned industry. Speaking at a University of Michigan industrial relations conference, Glenn Griffin, an educational consultant with the council reported that automation has, however, substantially reduced safety hazards in materials handling and machine feeding.

Worker Reactions — Other job hazards have increased, he says. These are in the areas of maintenance and mental health. "Some men are overcome by the urgency that results from a machine's setting the pace and the feeling that nothing must stop it. . . . Others may become bored and do dangerous things just to provide a little interest and excitement," he explains. Of course, this is a real problem for all industry, not just automated plants, he admits.

Boredom Is Dangerous—An example given: Army truck drivers in slow moving convoys have had rear-end collisions because they were driving with their feet hanging out the window. Thus boredom and frustration may prove big problems for isolated workers in plants with much automation.

Another important hazard that exists in automatic operations is that transfer lines may be shut down, then started up again while maintenance or repair men are still working on them, or are in a dangerous position.

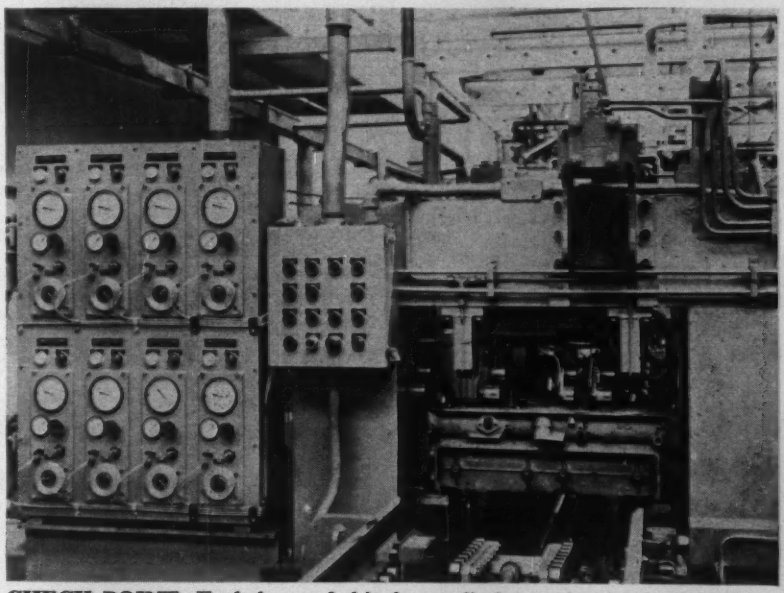
Hurry, Hurry — Then too, with such operations, the importance of keeping the line going is so great that maintenance crews will often try to make minor repairs and adjustments while the machinery is running. Scheduling of preventive maintenance at regular intervals can eliminate this problem.

Mr. Griffin admits present reports are still meager. Yet he feels there is evidence that on the whole safety rates may improve with automation. For instance, one company reported a 60 pct drop in its accident rate in four years after installing transfer lines for engine block machining.

Some Injuries Reduced — Another report credits automation for almost eliminating hernia, eye troubles and foot injuries from on-the-job accidents. The speaker cited a Harvard Business School finding of several safety advantages. The study was said to cover 12 automated plants. In no case were operations reported to have become more hazardous.

But if automation is eliminating many plant accidents, catastrophes still are possible, Mr. Griffin says.

Engine Line Has Automatic Check Point



CHECK POINT: Each bore of this four-cylinder engine is checked automatically at this air gaging station as it moves down a new transfer line built by the Cross Co. for Pontiac's small-car engine line.

Terry Potts travels 35,000 miles a year to

Terry Potts, Manager of Stainless Steel Sales of the Horace T. Potts Company, a leading Philadelphia steel service center, backs up his belief in personal service by logging some 35,000 miles a year by car, train or plane. His territory ranges from New York to North Carolina, and as far west as Altoona, and he's usually gone three days a week on service calls. He knows personally most of his 3,000 customers.

Behind Terry are the resources of the Horace T. Potts Company, which include a $1,250,000 Stainless Steel warehouse inventory, plus equipment for shear cutting, saw cutting, flame cutting, threading and corrugating. The Potts Company also manufactures Speedline Stainless Steel pipe fittings which are marketed by distributors coast to coast. A fleet of 17 trucks fan out over the Potts service area—some of them based in Baltimore for "relay delivery" to the Maryland region. Independent carriers are also used to assure on-time delivery.

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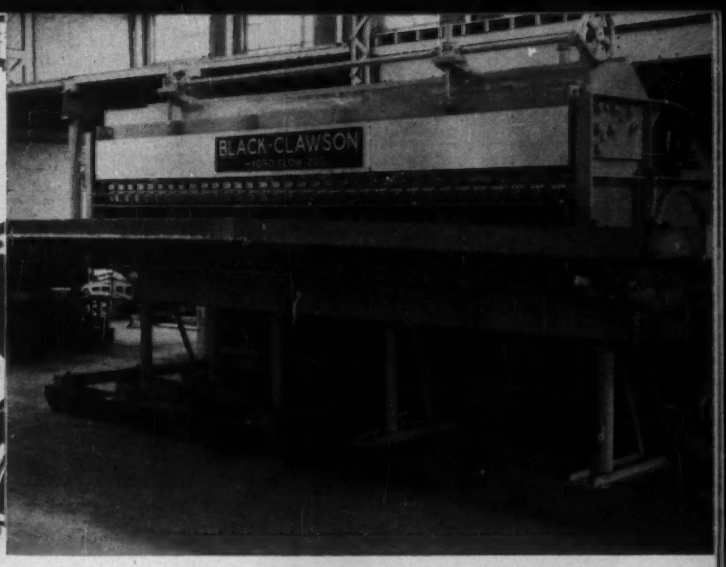

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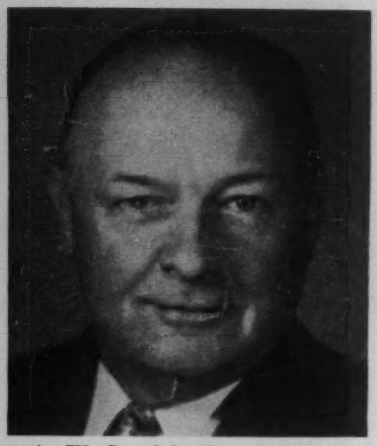


A. W. Steudel, elected chairman of the board and chief executive officer, Sherwin-Williams Co.

U. S. Steel Corp.—**N. C. Michels,** appointed vice president, facility planning and appropriations.

Hevi-Duty Electric Co., Div. of Basic Products Corp.—**R. G. Nordstrom,** appointed executive vice president.

Kaiser Aluminum & Chemical Corp.—**S. B. White,** named vice president, manufacturing (aluminum).

Stromberg-Carlson Div. of General Dynamics Corp.—**Dr. N. A. Finkelstein,** appointed vice president, research.

Avco Corp.—**K. R. Wilson, Jr.,** elected chairman of the board and chief executive officer; **J. R. Kerr,** elected president; **Col. E. H. Blaik,** as chairman, executive committee.

The Firewel Co., Inc.—**E. F. Knapp,** named vice president, manufacturing and a member of the board.

Greer Steel Co.—**G. K. Steely,** elected secretary and general manager, sales.

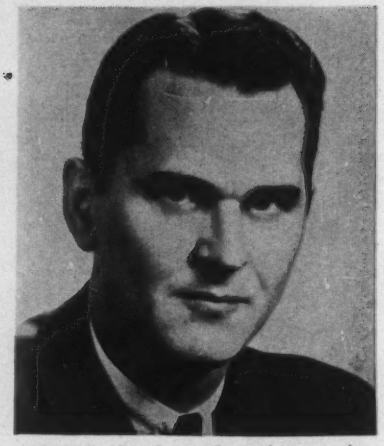
H-P-M Division, Koehring Co. —**W. J. Fath,** promoted to director, manufacturing.

Stainless and Strip Div., Jones & Laughlin Steel Corp. — **J. L. Thoman,** appointed manager, operations, Kenilworth, N. J. plant; **Jerome Brown,** named Div. industrial engineer.

Sheffield Div., Armco Steel Corp. —**H. S. Baldwin,** appointed superintendent, rolling mills, Kansas City works.

Filter Div., The Meaker Co.— **Lawrence O'Hanlon,** appointed chief design and application engineer.

The Electronics and Ordnance Div., Avco Corp.—**Z. K. Geanes,** appointed West Coast marketing manager.



R. M. Gordon, elected executive vice president, The Milford Rivet & Machine Co., Milford, Conn.

Morton Machine Works Div., Brubaker Tool Corp. — **A. W. Tilder,** appointed general manager.

Buell Engineering Co., Inc.—**L. S. Goldberg,** appointed director, marketing.

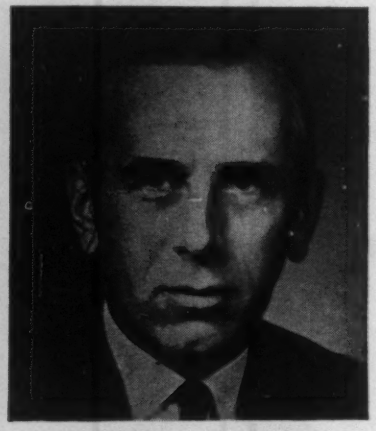
Borg-Warner Corp. — **W. B. Shimer,** appointed director, manufacturing services.

Acme-Newport Steel Co.—**C. K. Bonniville,** appointed general purchasing agent.

Air Reduction Sales Co.—**J. H. Berryman,** appointed manager, Special Products Dept., Union, N. J.

Kaiser Aluminum & Chemical Corp.—**M. L. Lee,** appointed director, metal planning and control.

T. G. Lanphier, Jr., elected president, Fairbanks, Morse & Co.



E. C. Baldwin, named president, Sherwin-Williams Co.

F. L. Byrom, elected president, Koppers Co., Inc.

Expands "Robot-Tool" Use

A $3 million expansion of its battery of tape-controlled automatic-machine tools is slated for Republic Aviation. Ten more tape-operated machines will be added to the line which turns out the F-105D fighter-bomber. The expansion is part of an industry-wide program under Air Force and company sponsorship to reduce costs of making advanced aircraft and missile parts.

Defense Business to Alter

The defense business will soon see a shift from large to small production volume, according to J. H. Richardson, vice-president, marketing, Hughes Aircraft Co. Mr. Richardson said the "new" defense business has resulted in a "buyer's market" characterized by "sophistication, small volume, closer management, more cost-consciousness, an indeterminate nature, high risk and a low return."

Missiles Take to Rails

More than 100,000 miles of the nation's railroads will be called upon to serve as a mobile launching pad for U. S. ballistic missiles. The Air Force will soon complete plans to put Minuteman missile on rails. The first of the mobile bases will be in operation in 1962.

Move Out to Sea Also

The seas are playing an increasingly larger role in the U. S. space program. The Navy is developing new low-cost methods for launching space satellites from ships, floating docks, and underwater craft. The Navy hopes to get money from Congress in January to go ahead with their projects. Meanwhile, the Defense Department is spending $63 million to modernize the Atlantic missile range.

Casts Giant-Size Ingot

Probably the largest rectangular aluminum ingot, 26½ x 72 x 180 in., has been cast by Reynolds Metals Co. for use in the Aluminaut. The Aluminaut is the aluminum research submarine designed to explore the ocean's depths three miles down. The 31,750-lb ingot of alloy 7079 will be forged into the first of several cylindrical rings which when joined together will form the submarine's 48-ft long hull.

Needed: Ground Support

One area often overlooked by potential aerospace suppliers is the growing need for ground support equipment—even for manned space vehicles. Current emphasis on human-factor research means much equipment and testing facilities must be developed to simulate conditions beyond the atmosphere.

Boosts Tungsten's Range

Raising the operating temperature limits of pure tungsten are new tungsten-base composites. What happens is that the second material in the composite melts, vaporizes, and serves to dissipate heat from the surface. Other advantages claimed for the composite over pressed and sintered tungsten are: improved fabricability and machinability into rocket nozzles; greater resistance to thermal and mechanical shock.

Forges Titanium Bottle

Advanced fabrication techniques are responsible for making a lightweight titanium bottle to contain 3000 psi compressed air for pilots' emergency use. Made of heat-treatable B-120VCA, the bottle is forged under close control in two identical sections. It's then machined to final shape and welded in a helium atmosphere.

Eyes Space as Market

Outer space is already being recognized as a market calling for commercial attention. Westinghouse Electric Corp. and Aluminum Co. of America are two who have broadened their sights to take in the universe. Westinghouse has renamed its aircraft operation at Lima, O., the "Aerospace Department." Alcoa recently appointed a development manager for aerospace and military equipment.

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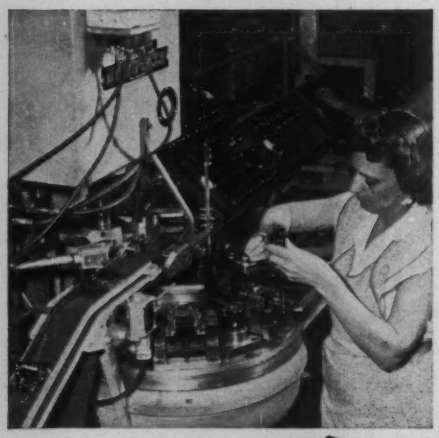
DENISON HydrOILics

DENISON Multipress installation pays off for BARBER-COLMAN with faster, simplified small motor assembly that...

CUTS COSTS



DENISON 4-TON HYDRAULIC MULTIPRESS *is used by Barber-Colman to assemble low-cost precision AC motors.*

PREDICTED cost cuts have been *confirmed* by the installation of three Denison Multipresses at Barber-Colman Company in Rockford, Illinois.

Justified by MAPI (Machinery and Allied Products Institute) formula analysis, these presses operate in a line connected by belt conveyors. Semi-automatically, Multipresses perform bending, staking, aligning, compressing, riveting and stamping operations in the production and assembly of small precision electric motors.

In addition to more efficient handling of production functions, other Multipress *bonus benefits* include—product uniformity... reduced scrap loss... rapidly adjustable stroke length and pressure for faster, simpler set-up... longer die life to lower tooling costs and downtime.

Duplicate these savings and bonus benefits in your plant today! Your Denison Production Specialist can show you how with a **M**ultipress **A**nalysis **P**rogram that can **MAP** new savings for you now.

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American Brake Shoe Co.
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How Friction Welding Joins Bar Stock and Tubing

Research has definitely paid off in the design of this compact friction welder.

It can produce welds of very high quality in a fraction of a minute on metals, plastics and even ceramics.

By **R. R. Irving**
Welding Editor

■ To researchers at the Central Research Laboratory of the American Machine & Foundry Co., Springdale, Conn., the year 1958 stands out as a milestone in welding research. It was in that year that AMF studies revealed the basic understanding of friction welding. In this process, the heat of sliding friction is used to weld two objects.

Although there were accounts of friction welding published in Russian journals in 1957, data were scanty. AMF studies took a separate and independent course. Fortunately, AMF engineers soon found they could weld in a range of mechanical variables unknown to Russian researchers.

As is often the case with independent basic research in new areas, similar results are achieved by both parties. The American company, however, surpassed many of the limits proposed by the Russians by welding at opposite ends of the scale.

Definition—What is friction welding? It's a process where mating surfaces reach actual welding temperature from the heat of friction. Such heat is developed by rotating or sliding upon one another the abutting ends of two metal, plastic or ceramic cylinders.

As soon as sufficient heat has developed (and certain other conditions reached), motion between the two rubbing surfaces is rapidly stopped. The objects are then fused together. With proper control, the welds are as refined as those produced by electron beam welding.

The critic might say that friction welding has limitations. In a sense, this is true. At least one of the objects should have a circular cross section. On the other hand, friction welding is not restricted to the welding of metals. Plastics and ceramics can also be fused.

A Challenge—To M. B. Hollander, friction welding became a challenge. For it was largely as a result of his zeal for the process that the company embarked on the research program. H. I. Fusfeld, AMF's Director of Research, chose Dr. Hollander to head the study. No longer a one-man team, Dr. Hollander

NEW HORIZON: AMF's Director of Research H. I. Fusfeld (right), and the inventor, M. B. Hollander, watch friction welding in action.

now has several researchers assigned to the program.

Has this team met with success? Judge for yourself. One day a routine call came in from AMF's testing facility. It had taken this group some time to check the soundness of welds on certain normalized friction-welded samples.

The truth of the matter was that the examiner had trouble finding the welds. They were perfect. In this instance, two cylindrical shapes had been joined together. One specimen was 1045 and the other 4140 steel.

Main Target—According to recent reports from the Soviet Union, friction welds are being made using very high pressures and torques. Although AMF's cycle is a few seconds longer, it produces welds of exceptionally fine quality by going to higher speeds and lighter torques.

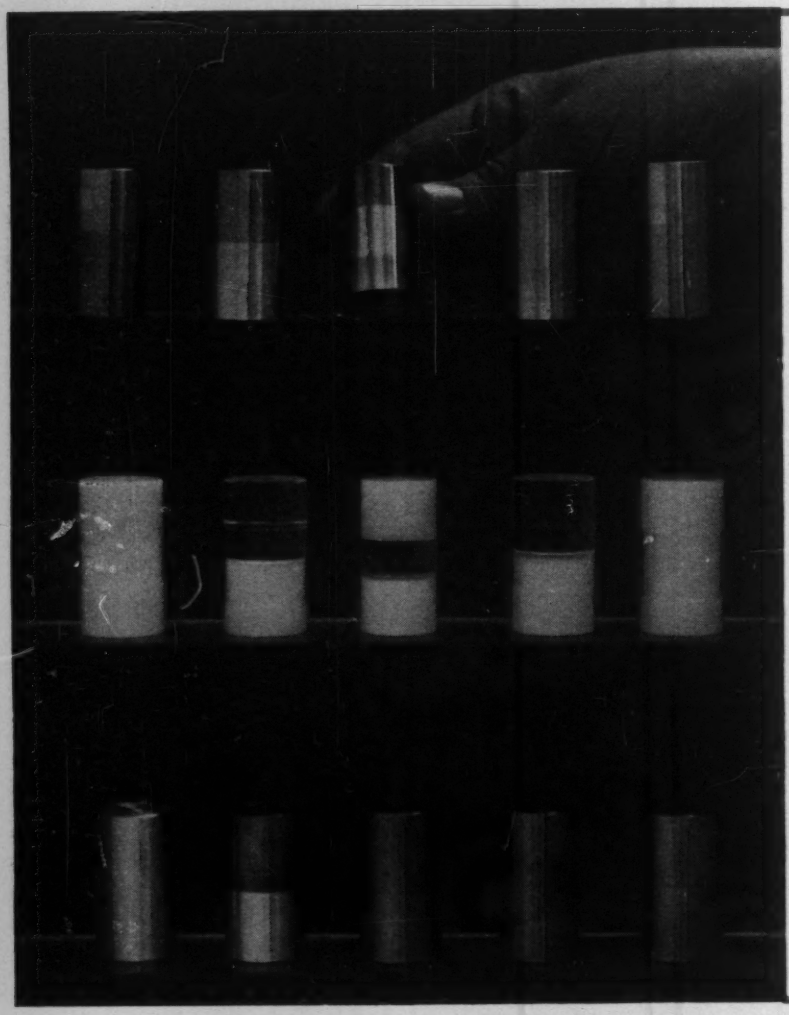
Compare the results in welding two sections of 1-in. bar stock. The Russians rotate one workpiece at 2000 rpm, while applying 10,000 psi contact pressure at the interface. AMF achieves even better results by rotating the pieces at relative speeds of 12,000 rpm, while holding the pressure below 1500 psi.

The American cycle is slightly longer than the Russian cycle. Nevertheless, both cycles take only seconds to complete. In this case, the total time required to complete both cycles is only 30 seconds.

Industrial Uses—What commercial jobs can friction welding handle? Engineers from several nations behind the iron curtain met recently to discuss the current uses of the technique.

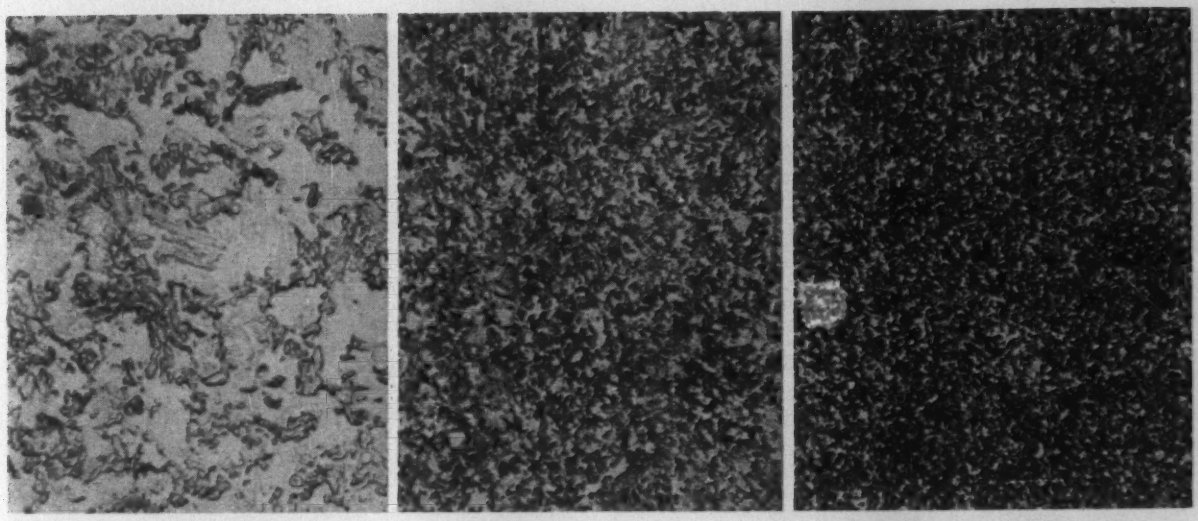
Here are a few examples of the production jobs friction welding now serves in these nations: blanks for pinions; pneumatic hammer rods; piercing tools; stud-to-plate combinations; blanks for steel bolts; belt conveyor axles; piston-to-rod joints; and battery terminals.

AMF researchers point out the many advantages of friction welding. Since it's basically a machine process, friction welding is highly adaptable to automation. Compared to competitive welding methods, it requires small amounts of power. At the same time, fast results can be obtained.



Welds Diverse Range of Metals and Plastics

Here are several of the many dissimilar materials that friction welding will join together. On the top row (left to right) are examples of welds joining brass to copper; brass to aluminum; aluminum to brass to low-carbon steel; brass to brass; and brass to stainless steel. The middle row contains welded samples from the family of plastics. They include delrin to delrin; delrin to lucite; delrin to lucite to nylon; nylon to lucite; and nylon to nylon. The bottom row (left to right) pictures welds of stainless steel to stainless steel; stainless steel to copper; copper to aluminum; copper to copper; and aluminum to aluminum. Current studies are being carried out in other areas, too. These investigations include the welding by the friction method of Monel to the 6000 series of aluminum as well as Monel to the 304 series of stainless steel. Still another metal combination is the friction welding of zirconium to low-carbon steel.



INVISIBLE LINE: Weld line at center of each photomicrograph is all but invisible. Magnifications (from left) are 500x, 100x and 50x. Sample is normalized friction weld between 4140 and 1045 steels.

Pipe and tubular sections can be welded as well as solid sections. Properly controlled, the weld is every bit as strong as the weaker of the two parent materials welded.

Slightly Soluble—AMF studies have found that as long as one material maintains about 1 pct solubility in the other, the technique may work. Even when such limited solubility doesn't exist, pieces can still be welded by using an intermediate slug of mutually compatible material.

Friction welding depends on the proper selection of several parameters. Among them are speed, pressure and time. In attempting to weld different materials, it's best to run through the range of variables to find the ideal conditions in each case.

Fluid Metal—AMF has achieved a weld cycle where the interface changes from a dry state to one where a thin layer of fluid metal appears. Fluidity during the cycle prevents the formation of harmful oxides and inclusions in the weld.

Weldable diameters at Springdale include bar stock up to 2 in. and pipe up to 6 in. For best results, one piece must be cylindrical. The other piece can be a plate.

Family of Plastics—Thermoplastics have also been explored at the Central Research Lab. Its researchers have successfully welded lucite, delrin and nylon to themselves and to each other.

Here's another feature worth noting. The friction welding machine is a form of lathe. This being the case, it can also be used to machine its own welds. This includes turning off the upset metal at the friction weld.

The Research and Development Division of AMF plans to continue its study of friction welding with an aim toward further refinements and added proof of its current theories. The company expects to put the friction welder on the commercial market shortly.

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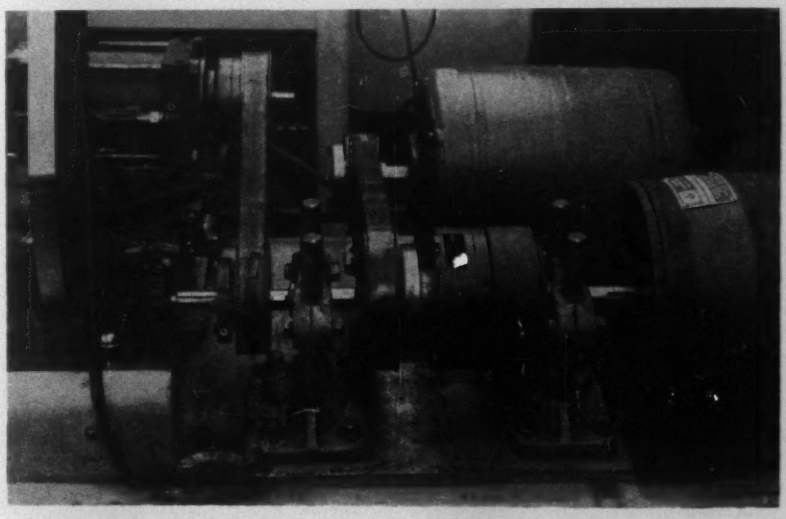
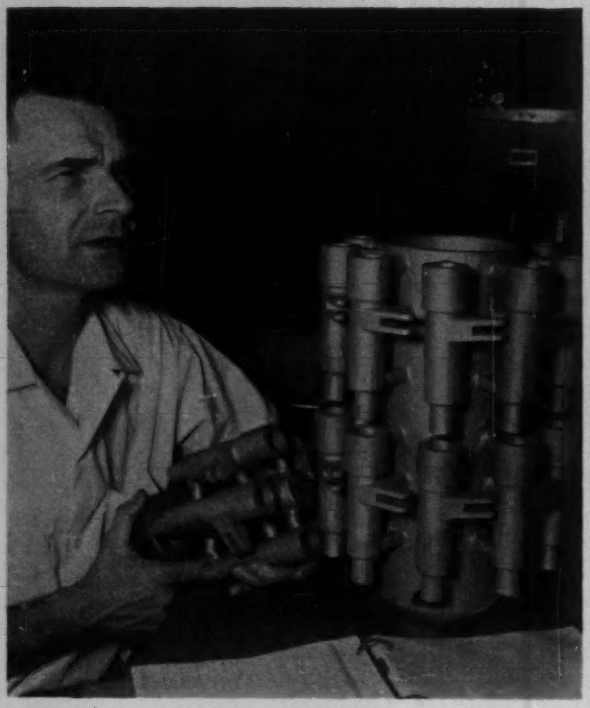
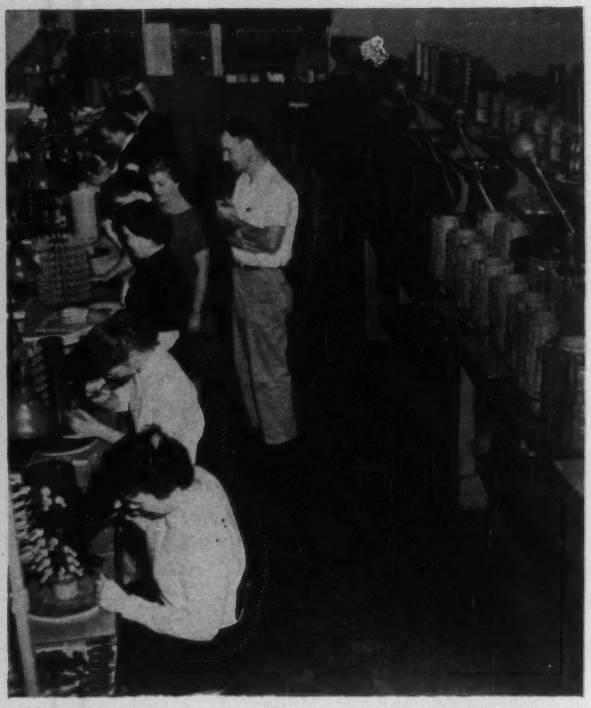


DRIVE MOTOR: Simplicity is the byword in the drive mechanism for the friction welder. A brake and clutch are part of the setup.



MORE PARTS: Switch to hollow sprue boosts output to 18 parts per setup from four parts with solid sprue. Castings are made of 17-4 PH alloy.



LARGE PRODUCTION: Wax or plastic patterns can be used with the hollow sprue. As many as 1300 or as little as eighteen patterns can be attached to it.

Hollow Sprue: Radical Design Proves Out in Production

"It won't work" is the usual comment heard about a new, hollow sprue.

But reports are that the new sprue boosts output and improves castings quality.

By C. L. Kobrin,
Metallurgical Editor

■ When it comes to technological progress, foundry metallurgists take a back seat to no one. Consider, for example, the latest in a long line of process improvements by precision-investment casters. It's called the "hollow sprue."

To some, the "hollow sprue" may sound like science fiction. But not to Precision Metalsmiths Inc., its developer. The company's lower production costs and improved properties of castings are real enough.

Violates Theories—Though developed mainly for the shell molding process, it's believed that the sprue has far-reaching significance. In as much as it successfully violates accepted foundry practice, adaptations of it may find their way into other casting processes.

As the name implies, the new sprue is not a wide-open passageway. Instead, metal flows through the thin walls of a cylinder to reach the mold cavities. Metal is poured into the sprue while the ceramic-shell mold is under the influence of a vacuum assist.

When asked to spell out the advantages of the new sprue, R. R. Miller, president, and C. H. Watts, director of research and development of the Cleveland precision-castings company made these points.

Freezes at Once—Product quality is improved. Apparently, the entire system—sprue, gates, and parts—solidifies at the same time.

Precision Metalsmiths' metallurgists find little porosity, segregation or decarburization in the castings. The lower amount of decarburization seems to point up a trend. Less "decarb" was noted when investment casters shifted from a solid

mold to a shell mold. And now there's even less when using a hollow sprue.

Rockwell hardnesses along the length of a casting are quite consistent. Physical properties are improved. Castings of AISI 4140, for example, now have an ultimate tensile strength of 220,000 psi as against 180,000 psi as previously reported. This gain in strength is not at the expense of ductility, adds Mr. Watts. Elongation values are improved also.

Obtains Smooth Finish — What about surface finish? According to Leo Carr, who heads up special projects for the company, the as-cast surface of steel parts has a finish which ranges from 50-85 microinches rms. On occasion, 32 microinches rms has been obtained.

The customer isn't the only one to gain, admits Mr. R. R. Miller. The new sprue also helps cut production costs. Since it weighs less than a solid sprue, handling problems are reduced.

Moreover, furnace operators report that remelting of the hollow sprue for future pourings takes less time and furnace energy than a solid sprue.

Still A Mystery—What's most baffling about the new sprue is that the molten metal does not freeze in the thin walls before it fills the molds. As yet, no completely satisfactory explanation can be given.

However, Mr. C. H. Watts suggests this possibility. The hot flowing metal quickly heats the thin ceramic shell so that a uniform temperature throughout the system results. Thermal gradients are very low. Result: the metal solidifies at virtually the same time. And the structure is of uniform grain size rather than the normal as-cast structure.

Precision Metalsmiths believes that the vacuum assist is vital to getting the molten metal into the mold cavities. (By exerting its influence over the whole porous-shell coating, it helps to pull metal into all sections of the intricate mold.)

Await Evidence—Does it also contribute to improved metal properties? There's no evidence as yet that it does. But it's possible that pulling the air out of the mold before the onrushing molten metal aids in reducing porosity.

Use of the hollow sprue imposes no penality on the shell molding process. The usual line of alloys can be cast. These run the gamut from lightweight beryllium and aluminum alloys to 17-4 PH and Haynes Stellite.

As with the standard sprue, a large number of parts can be attached to one sprue to make up a tree. One tree may contain as many as 1300 parts; another may hold as little as 18—each weighing 26 ounces.

Mechanize the Line—Precision Metalsmiths has introduced another innovation into its ceramic-shell molding line. The line is now mechanized. One man can run it to turn out one complete shell every five minutes.

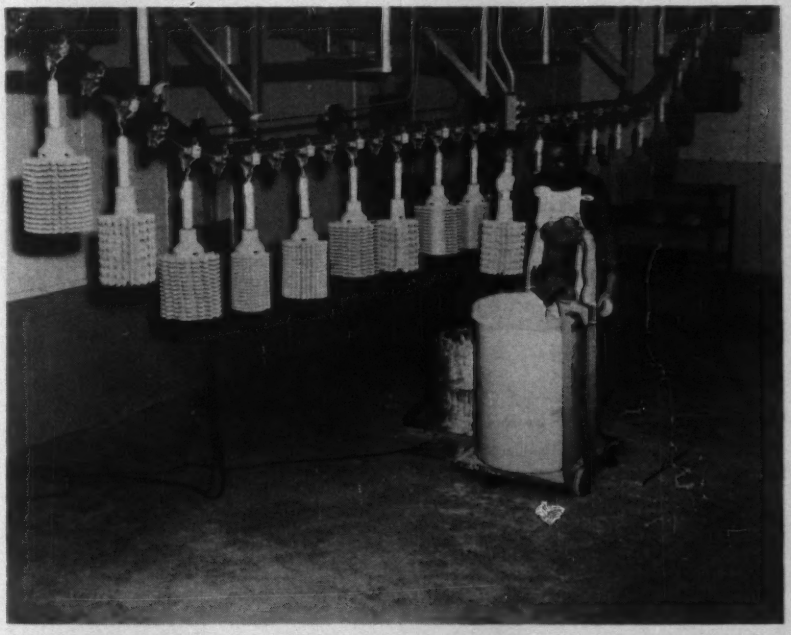
With one or two exceptions, the procedure follows most shell molding practices. The tree full of parts is first dipped into a slurry of ceramic materials. After the excess drips off, it's then dipped into a fluidized bed of fine silica sand.

After the dip, the tree assembly is hung to dry on a line moving at a preset speed. Time for the ceramic and sand coating to be put on is 50 seconds. Five to seven such coatings followed by drying, burn-out of patterns, and preheating prepares the assembly for pouring.

Uses Plastic Patterns—Another key feature of the Precision Metalsmiths line is the use of plastics instead of wax patterns. They can be used for those castings—ferrous and nonferrous—that are not too large or complex in design.

Plastic patterns have a number of advantages, says Leo Carr. The polystyrene is less costly; forming rates are faster; handling costs are lower.

Another point is that the plastic-pattern-making technique makes short runs economically practical. As many as eight dies can be run concurrently on the injection molding unit. When the prescribed number has been made, all that's needed is to replace a die with one of another shape.



SPEEDS COATING: With mechanized line, one man can turn out a complete shell every five minutes. Fluidized bed to put on silica is key feature.

Analyzer Checks Furnace Gases

Sample gases from a gantry furnace are rapidly checked by an analyzer-controller device.

By monitoring four gases in only five minutes, this device controls carbon-dioxide build-ups to within ±0.02 pct.

■ Chromatographic instrumentation serves on one of the largest gantry furnaces in the country. With this setup, the Commercial Steel Treating Corp., Detroit, obtains good results in carburizing, carbon restoration and plain heat treating.

The huge furnace handles parts up to 28 ft long and 5 ft., 8 in. in diameter. It's equipped with an atmosphere analyzer that controls carbon-dioxide buildups to within ±0.02 pct.

This furnace analyzer, made by the Perkin-Elmer Corp., Norwalk, Conn., indicates atmosphere composition inside the furnace. A closed-loop system regulates the heat-treating atmosphere via pneumatic valves.

Close Carbon Content—Importance of this setup appears in the following results. In a recent carburizing load, Commercial's engineers aimed for 0.85 pct carbon. On the first attempt, they got 0.81 pct. A short time later, another steel was carburized, with 0.70 pct carbon as a target. Result was 0.68 pct.

Accuracy is consistent. The reason carbon can be precisely controlled hinges on the analyzer's rapid, four-component capabilities. Directly analyzing CO_2, CH_4, N_2 and CO on a five-minute cycle, the instrument reads out CO_2 concentration within ±0.02 pct. By simple subtraction, it gives hydrogen concentration.

Aside from accuracy, the gantry furnace offers another major advantage. This bonus is size. For example, among early jobs, the furnace treated 20-ft long drill rods.

Other furnaces kept such rods to lengths of about 12 ft. Now, rod makers can use 20-ft heat-treated lengths. This reduces joining problems. It also helps to maintain straightness.

Uses Carrier Gas—Composition of a furnace gas includes any or all of the following: H_2, O_2, N_2, CO, CO_2, CH_4, NH_3 and water vapor. An inert-carrier gas sweeps fixed-volume samples through a length of tubing into the analyzer.

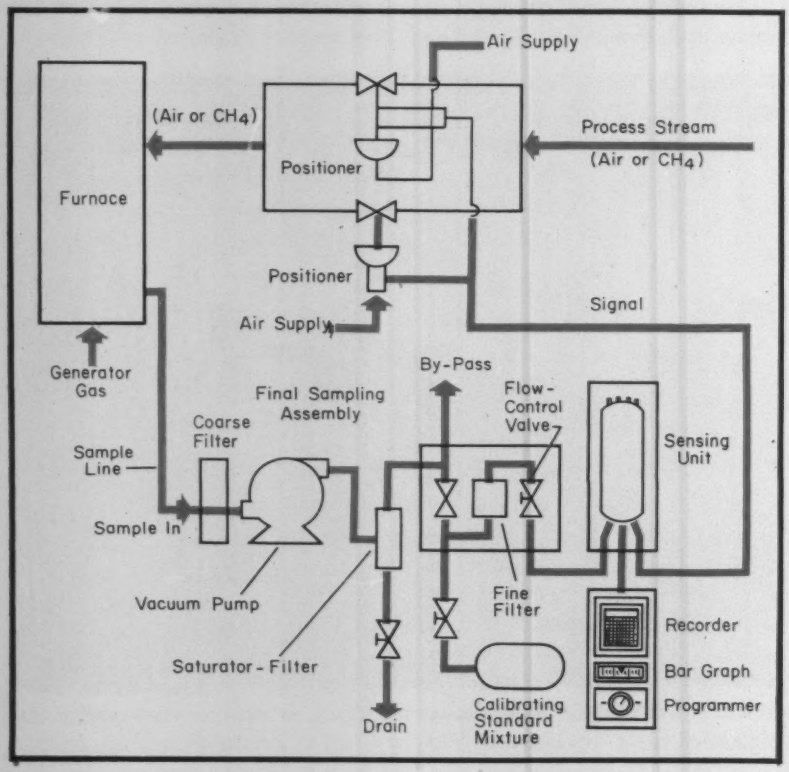
Packed in this tubing are granules of diatomaceous earth. These granules are coated with a liquid in which sample components are soluble to varying extents.

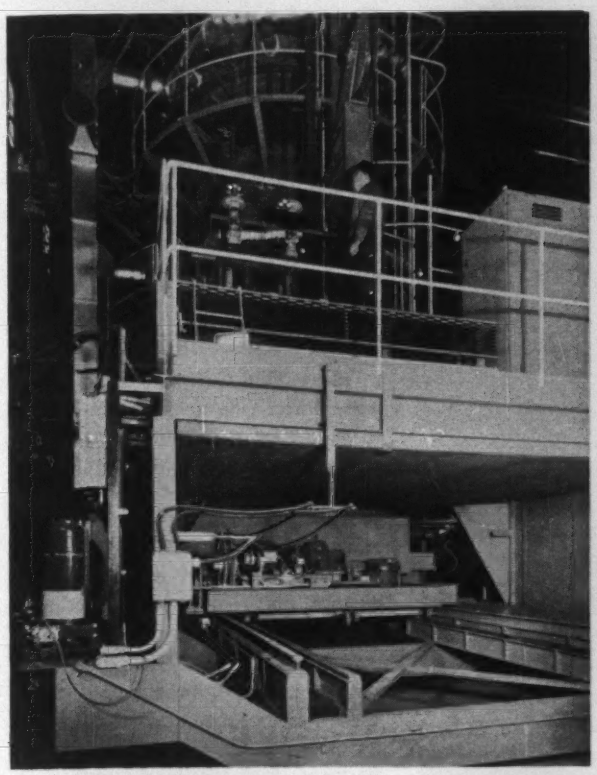
As the components pass through the column, they're retarded to differing degrees. Thus, they emerge separately at the tube's outlet. A simple thermal-conductivity cell measures the concentration of the emerging components. The cell transmits this information to a recorder.

Since some components have longer column-retention times than others, and since the same packing material isn't effective for all, the analyzer uses several columns. One sensing unit monitors all columns.

Complete Control—A programmer controls all functions of the sensing unit. It allows a fixed component to be programmed for readout on the recorder's bar chart. This programmer adjusts the concentration signals from the sensing unit. Thus, it lets the recorder present

System Controls Heat Treat





MAINTAINS DESIRED ATMOSPHERE: Operated automatically by signals from the control system, the valve assembly adds air or methane to the furnace.

SIZE IS NO PROBLEM: Hanging near the furnace prior to loading, 20-ft rods illustrate the unit's capacity. Operator at left checks atmosphere recorder.

the amount of each component directly in percentage of total gas volume.

To maintain dependable performance under the rugged conditions that are present around heat-treating furnaces, all handling and conditioning equipment for the gas samples has been designed with four points in mind.

These points include the fact that the gas may be dirty or sooty. It may even be saturated with water vapor. Also, gas pressures may not be high enough to cause flow through the analyzer.

Metered Flow—Dirty, sooty and water-saturated samples present no problems to the new analyzer. However, a pressure drop can prove a headache. The gas flow should be metered to insure that the analyzer always receives a fresh sample.

The analyzer's sample system includes a coarse filter, an oilless vacuum pump, a filter saturator, a final sampling-assembly device and a flow meter. Dirt and soot are removed from the gas stream by the coarse filter. This protects the vacuum pump.

Pressure from the pump insures adequate sample flow. The saturation filter provides wet gases with a uniform moisture content. In the system, there's also a place for removing condensed water. The latter is a must, because the analyzer always withdraws a constant volume of gas from the sample stream.

No Moisture Problems—If the moisture content in the gas isn't controlled, then the volume of gas entering the constant-volume sample loop will vary. The filter saturator eliminates this problem.

Final-sampling assembly provides a means of by-passing part of the sample. This action serves a threefold purpose. It can be used for fine filtering, flow regulation or for the introduction of a calibration sample. A flow meter checks the sampling system's performance.

The gas analyzer and its sampling system are mounted in a single unit. This compact setup also has space for the carrier and calibration gases.

To put the analyzer into service, the user simply connects a sample line between the furnace tap and the sample manifold. Then he plugs the power cord into the nearest 115-v source.

Both sensing unit and programmer use a millivolt output signal which feeds into an accessory called a "peak picker." This is the key to the pneumatic-control system. It picks out and remembers a predetermined peak of the gas components being analyzed. At the same time, it records a regular bar graph of all components.

Unit Shear-Forms Big Cylinders From Small Preformed Blanks

A new machine shear-forms cylindrical and conical parts with diameters up to 70 in.

At the same time, this cold-extrusion process reduces wall thickness. Tolerances can be held to a few thousandths.

■ One of the largest horizontal shear-forming machines ever built will soon find its place on the production floor. This machine cold-extrudes both cylindrical- and conical-shaped parts up to 70 in. in diameter.

Initial use for this huge giant centers on the production of large-diameter rocket cases. These cases serve on intercontinental ballistic missiles.

Uses Dual Rollers—The new unit is a dual-roller Floturn machine, made by Lodge & Shipley Co., Cincinnati. It's owner, the Allison Div. of General Motors Corp., plans immediate use of the newcomer in flow-turning of engine-case cylinders for the Minuteman. Big reductions in both material and machining costs are expected.

Ultrahigh-strength steel cases are presently formed by machining the wall thickness of cylindrical (ring) forgings. Tolerances are measured to three decimal places. Four of these sections, each 48 in. long, are then welded together to form each case's cylindrical portion.

Using the Floturn process, three cylindrical forgings, only 28 in. long, can be elongated or "stretched" to the required case length. At the same time, this cold-extrusion process reduces wall thickness to the proper dimension.

Three-Fold Savings—With fewer and shorter ring forgings needed for each case, flow-turning is expected to yield raw-material-weight savings of more than 50 pct. Savings of more than 80 pct in machining time are also expected. And since only three rings are needed instead of four, one girth-welding operation becomes a thing of the past.

Laboratory tests prove that both yield and burst strengths of flow-turned cases exceed qualification requirements. Thus, these cases insure uniform high-tensile strength. In fact, their strengths are equal to or better than the results obtained from cases made by the older method.

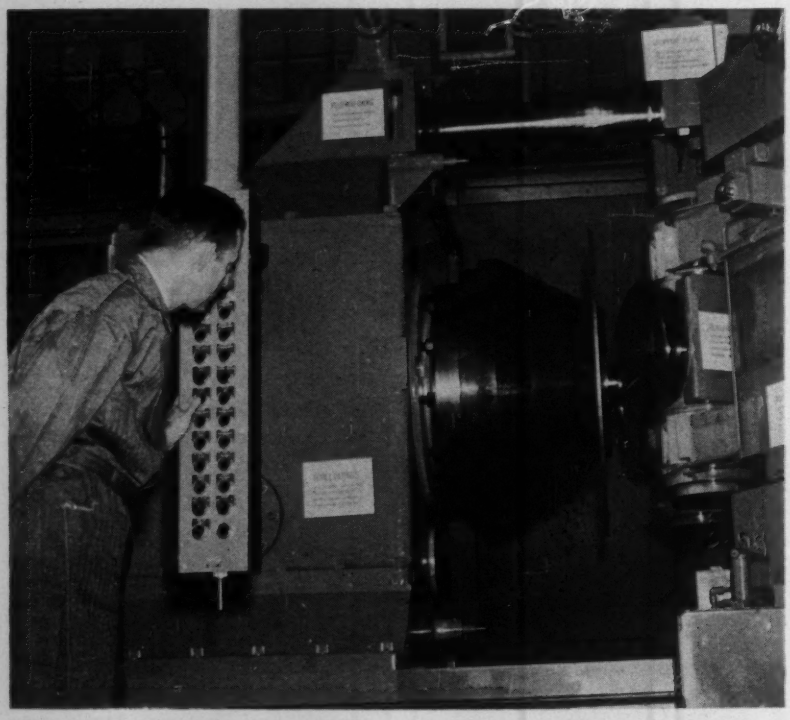
Cases for the Minuteman represent about 10 pct of the total loaded weight of the case plus propellant. An egg shell has about the same relationship to the weight of an entire egg.

Original work on the new rocket cases was done in the Floturn Development Shop. Here, the technique was perfected on a scale model of an actual engine-case cylinder.

Single-Roller Work—Test cases are now being made on a Lodge & Shipley single-roller Floturn machine. On these cases, the single-roller machine holds wall thicknesses to ±0.002 in.

The new machine is equipped with an opposing roller slide. Both slides are connected by a special crown. The entire assembly rides on a massive hydraulically-controlled carriage.

Due to the machine's design, it's possible to back-flow cylinders up to



STRETCH TO SHAPE: Steel blanks, 5/8 in. thick x 28 in. long, are flow-turned into engine-case cylinders for intercontinental ballistic missiles. Each blank is transformed into an 84-in. long cylinder.

a length of more than 140 in. Maximum length depends upon tooling and production methods.

Although its main use will be the flowing of cylindrical shapes, the dual-roller unit is also capable of forming contoured and conical parts. Such parts make up a major portion of missile-production work.

Start With Blanks — All these missile parts will be made from flat or preformed blanks. Workpieces may be mild steel, stainless steel, aluminum, brass or other alloys.

Blanks may be up to 1¼ in. thick. In a single pass, the machine reduces blank thickness by as much as 50 pct. This means that a flat blank can be flowed into a cone with a 30° angle on the side, with 50 pct reduction.

Allison's technicians prefer the dual-roller machine because they intend to use it primarily for production. Extra rigidity provides heavier feed rates. It also boosts material reduction.

Exerts 70,000 Lbs—Each of the independently-controlled and synchronized roller slides exert a force of 70,000 lb on the workpiece. A yielding tailstock gives a smooth and continuous carriage feed.

Feed stocks are locked to the headstock by pneumatically-operated locks. Mechanical and electrical interlocks prevent flowing operations unless the feed rolls are securely locked.

The carriage is a complex assembly. It has a number of functions. The obvious one hinges on carrying the two roller slides. These slides perform the actual flowing operation.

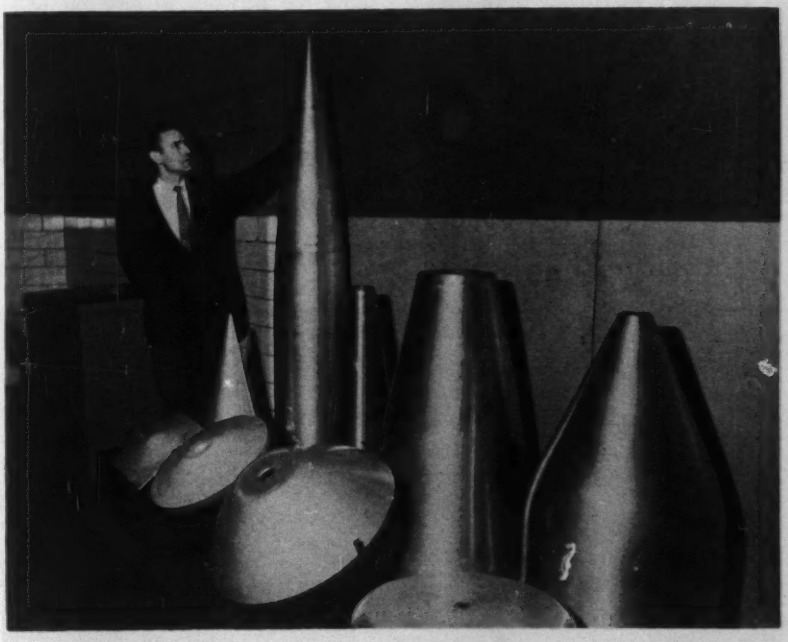
Smooth Operation — Carriage-feed cylinders are located in the top and bottom of the carriage. Being on the machine's centerline, they insure a smooth, even advancement or retraction of the carriage.

All hydraulic equipment is mounted on top of the carriage. This reduces the need for an excessive amount of flexible hose. Naturally, some hose is needed to carry hydraulic power to the various operating mechanisms.

Total weight of the machine is 190,000 lb. The 34-ft bed weighs 47,000 lb. A 150-hp drive motor powers the machine. Another 48-hp motor operates the compact hydraulic system.

Being of large proportions, the machine has substantial capacity. It can flow a piece up to 70 in. in diameter by 84 in. long.

MISSILE SECTION: Final sections are 70 in. in diameter x 84 in. long.



AEROSPACE PARTS: All these complex parts were made from flat or preformed blanks. In one pass, the machine reduces thickness by 50 pct.

Radio System Boosts Steel Flow

Two-way radios blanket all 350-acres of a tinplate plant.

These radio networks coordinate four general areas: maintenance, truck and rail movements and plant protection.

▪ Two-way radio systems help the nation's largest tinplate plant to keep rolling. Four networks at the Weirton Steel Co. have boosted operating efficiency 25 pct by improving on-the-spot communications.

The sprawling collection of equipment and buildings is located in Weirton, W. Va. Covering 350 acres, the plant employs 12,000 people.

Complete Coverage — Radio blankets Weirton's plant from its main gate to the company docks on the Ohio River. Each of four systems, using Motorola equipment, operates on a separate frequency. These networks are used to coordinate four general areas: maintenance, general transportation, railroad operations and plant protection.

The maintenance network covers upkeep of the plant's electrical-supply and distribution system. Several units used at the company's river works also share the same frequency.

Keeping electricity humming through the plant gets top priority on this network. Even a minute-long power loss means money lost. When something goes wrong, telephone switchboards are quickly loaded to capacity.

Radios in key spots speed instructions to repair men. These units are located in a line truck, a relay-and-meter truck and at the power house. Remote control units are in the electrical shop. Portable radios extend the network to men on foot.

Little Time Lost—Personnel in the electrical shop or at the power house can radio trucks to trouble spots within seconds. Portable radiophones, carried in the line truck, reduce actual repair time on the scene.

The portables are used in checking high lines for shorts or grounds and in climbing towers to inspect insulators. Repair work starts as soon as the problem is located.

Personnel at the power house hear the radioed reports. They immediately cut off adjacent lines and make other switches to speed repairs.

Ship to Shore—Weirton's docks handle incoming and outgoing barges on the Ohio River. The company's harbor boat contains a radio. An oil-pumping barge and an office overlooking the docks are also radio equipped. Men working on barges acknowledge instructions sent to them through 50-w speakers.

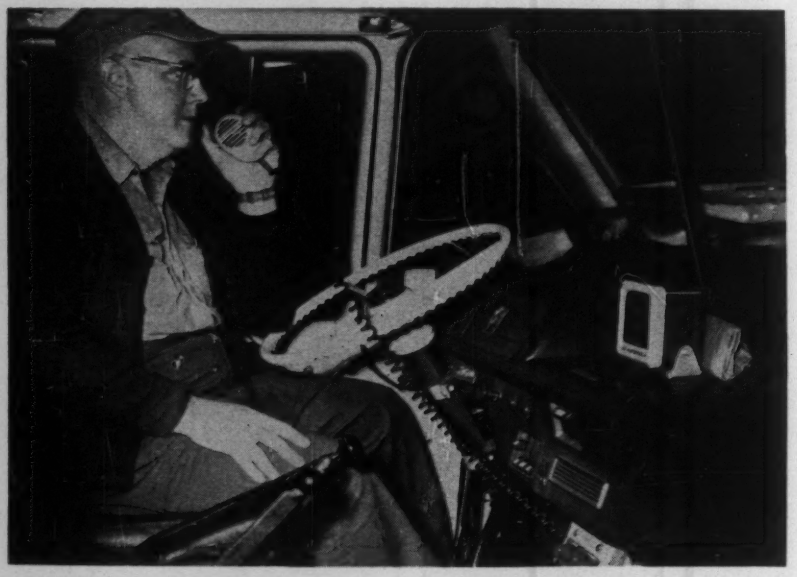
The transportation network is the largest of the four. It includes 35 radio-equipped vehicles used for pickup and delivery throughout the plant.

Company surveys prove that two-way radio enables its transportation department to handle more than twice as much material with 25 pct less trucks. Elimination of wasted trips is the reason.

No Backtracking—All requests for pickups and deliveries are routed through a radio dispatcher. He keeps a record of the location and assignment of each vehicle. Thus, he can radio a job to the unit that's nearest the scene. With fewer trips, the trucks operate at top capacity.

Eighteen radios in Weirton's railroad operations do the same vital jobs. Fifteen are in locomotives, one in a caboose and two in diesel-repair trucks. Focal point is the remote-control console in the yardmaster's office.

Plant-protection radio gets heavy use in emergencies. It's most valuable when ambulances and fire equipment are called to the plant. The system is also used to expedite control of railroad crossings, vehicle traffic and gate movements.



IMMEDIATE CONTACT: Driver radios his position to central dispatcher.

New Catalogues And Bulletins

Money-saving products and services are described in the literature briefed here. For your copy, just circle the number on the free postcard.

Laminated Plastic

Laminated plastic sheets, rods and tubing are described in an illustrated catalog. Technical data are given. (St. Regis Paper Co.)

For more data circle No. 1 on postcard

Melting Furnace

The advantages and features of an aluminum melting furnace are supplied in a bulletin. The furnace is for use in permanent mold, sand or die casting plants. (Sunbeam Equipment Corp.)

For more data circle No. 2 on postcard

Flame Cutting Machines

Flame cutting machines are described in a 28-page catalog. Included are complete specifications for each machine, illustrations of typical applications, and a description of machine accessories. (Linde Co.)

For more data circle No. 3 on postcard

Wire Cloth

Various types and grades of industrial wire cloth are described and illustrated in a bulletin. A complete listing of trade definitions, to help the reader understand the terms most frequently used in specification of wire cloth, is also contained. (The Cambridge Wire Cloth Co.)

For more data circle No. 4 on postcard

Area for Industry

In four colors, a 52-page brochure outlines all Kentucky's advantages for new and expanding industry. It describes the state's assets and advantages in such factors as: central location, transportation facilities, resources in power, coal and other raw materials. It also tells of its research facilities and manpower. (Kentucky Div. of Industrial Promotion)

For more data circle No. 5 on postcard

Hydraulic Force System

A technical reprint shows schematics, details and applications on a six-channel, hydraulic force system. The system is used for static and dynamic loading test stands. It is designed for up to 100,000-lb force capacity per cylinder. (Gilmore Industries, Inc.)

For more data circle No. 6 on postcard

Controlled Angle Torch

For tungsten inert gas, arcwelding, a controlled angle torch is illustrated in a bulletin. The bulletin describes the design features and applications of the torch. (Falstrom Co.)

For more data circle No. 7 on postcard

Coagulation Chemicals

Discussed in an eight-page illustrated brochure is the chemistry of coagulation. It is dealt with in respect to treatment in municipal and industrial plants and practical approaches to problems and solutions. (Nalco Chemical Co.)

For more data circle No. 8 on postcard

Ramming Mix

A publication presents burned magnesite-chrome basic brick. The brick has a dimpled metal jacket that provides built-in expansion. It is used in the hot zone of rotary kilns. The literature explains properties, uses, chemical analysis and installation data. (H. K. Porter Co., Inc.)

For more data circle No. 9 on postcard

Strip Metal Processing

Types of equipment used, in the continuous line processing of ferrous and nonferrous strip metal, are

Postcard valid 8 weeks only. After that use own letterhead fully describing item wanted. **12/29/60**

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FREE LITERATURE

discussed in a publication. The article contains illustrations of some of the largest strip processing installations in the country. Other articles are also presented. (Midland-Ross Corp.)

For more data circle No. 10 on postcard

Air Control Valves

A handy, quick-reference, specification catalog presents a tested design of mechanically and manually operated air control valves. A three-page spread gives all model numbers, specifications and operators in an easy-to-read chart. (Hoffman Valves, Inc.)

For more data circle No. 11 on postcard

Briquetting Presses

Complete with photos and illustrations, a bulletin describes a full size range of scrap briquetting presses. Charted specifications reveal various capacities of the six models which make up the line. Operating costs, metals handled and capacity data are included. (Milwaukee Foundry Equipment Div., SPO, Inc.)

For more data circle No. 12 on postcard

XY Plotting Boards

Transistorized XY plotting boards, both single and dual arm, are described in a five-page technical data sheet. Detailed features and specifications are given for the units. The units plot data from digital and analog computers. (Computer Systems, Inc.)

For more data circle No. 13 on postcard

Toggle Clamps

General-purpose and special-use toggle clamps are featured in a 36-page catalog. The literature is a "job aid" for tool and manufacturing engineers, purchasing agents and designers. Numerous application photographs are also given. (For free copy, write on company letterhead to Detroit Stamping Co., 330 Midland Ave., Detroit 3)

Actuators

Pneumatic spring and diaphragm actuators are dealt with in a four-page bulletin. It illustrates and describes the series. The literature also shows actuators in various typical combinations. Complete specifications, operating characteristics and dimensions are listed. (Conoflow Corp.)

For more data circle No. 14 on postcard

Mounted Points

Special shape, mounted points are detailed in a brochure. Complete specifications on wheels available, wheel shapes, wheel diameters, lengths, mandrel diameters and list prices make up this service brochure. (American Emery Wheel Works)

For more data circle No. 15 on postcard

Control Pilot Devices

Consisting of eight pages, a bulletin describes a line of control pilot devices. These include pressure and vacuum switches, pressure governor, plugging and anti-plugging switches, float switches, pilot switches and manual reversing switches. (General Electric Co.)

For more data circle No. 16 on postcard

Nylon Stock Shapes

Data on nylon stock shapes are given in an eight-page brochure. Physical properties of four grades of nylon are charted. Sizes of nylon rod, plate, sheet, strip and tubing are listed. Typical applications are illustrated. (Cadillac Plastic & Chemical Co.)

For more data circle No. 17 on postcard

Plating Process

A suitable bath, for heavy build-up for metal resizing, electroplating and electroforming, is described in a technical instruction bulletin. The bulletin illustrates and completely describes solution preparation for both still and barrel operations. (Hanson-Van Winkle-Munning Co.)

For more data circle No. 18 on postcard

Rupture Disks

All of the latest data on impervious graphite rupture disks is included in an eight-page catalog. It covers dimension standards on the four types of disks, venting capacities, gasket sizes and installation procedures and bolt torque specifications. (Falls Industries, Inc.)

For more data circle No. 19 on postcard

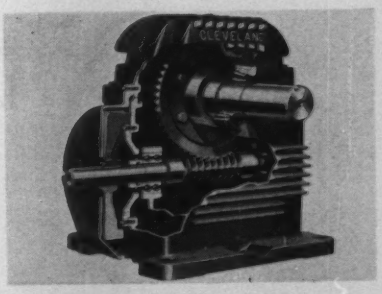
Machine Mountings

An informative brochure explains a quick, inexpensive and easy method of mounting heavy machinery. The folder outlines the advantages of molded neoprene machine mountings. (Durant Tool Co.)

For more data circle No. 20 on postcard

New Materials and Components

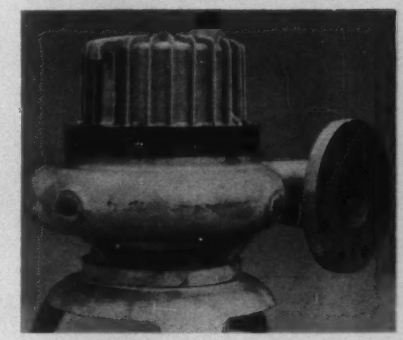
Speed Reducers Take Up Half the Space



Worm-gear, speed reducers offer horsepower capacities up to 80-pct higher than conventional reducers. Between two reducers of the same rating, space saved is 50 pct. Ratios extend from 4-1/7:1 to 95:1; ratings from fractional to 175 hp. The design of the specially-constructed radial fan employs plastic or aluminum. The fan is equally effective in either direction of rotation. It is on the input side of the worm shaft to efficiently scour the finned outer wall of the reducer. (Eaton Mfg. Co.)

For more data circle No. 25 on postcard, p. 57

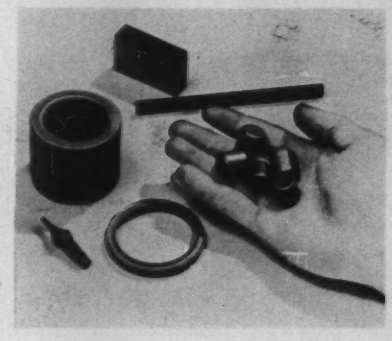
Submersible Pumps Handle Waste Material



To handle large solids and stringy material, such as industrial wastes, light sludge and slurries, a line of non-clog submersible pumps has the answer. These compact units are equipped with a one-piece cast iron impeller, either in two-blade design or a patented bladeless impeller design. The pumps come in 2-, 3- and 4-in. sizes. Totally enclosed, the non-ventilated induction motor can be had in a range from ¾-7½ hp. It has an oil-filled interior and finned exterior for rapid cooling in underwater operation. Installation in any sump or pit requires only one piping and a plug-in electrical connection. (Fairbanks, Morse & Co.)

For more data circle No. 26 on postcard, p. 57

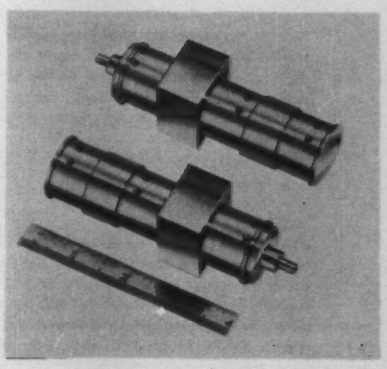
Titanium Diboride Fabricates into Many Shapes



Reducing the oxides of titanium and boron, a special process produces a very fine, high-purity powder. This powder can be fabricated into various shapes. Most high-temperature materials begin to weaken seriously above about 1500°C. Titanium diboride, however, maintains a flexural strength of 35,000 lb per sq in. over the wide temperature range of 25° through 2000°C. It has a high modulus of elasticity. The hardness of this material is in the range of boron carbide. This characteristic should lead to titanium boride milling media. Intricate shapes can be machined with conventional tools during processing. (National Carbon Co.)

For more data circle No. 27 on postcard, p. 57

Clutch-Brake Has All Stainless Steel Design

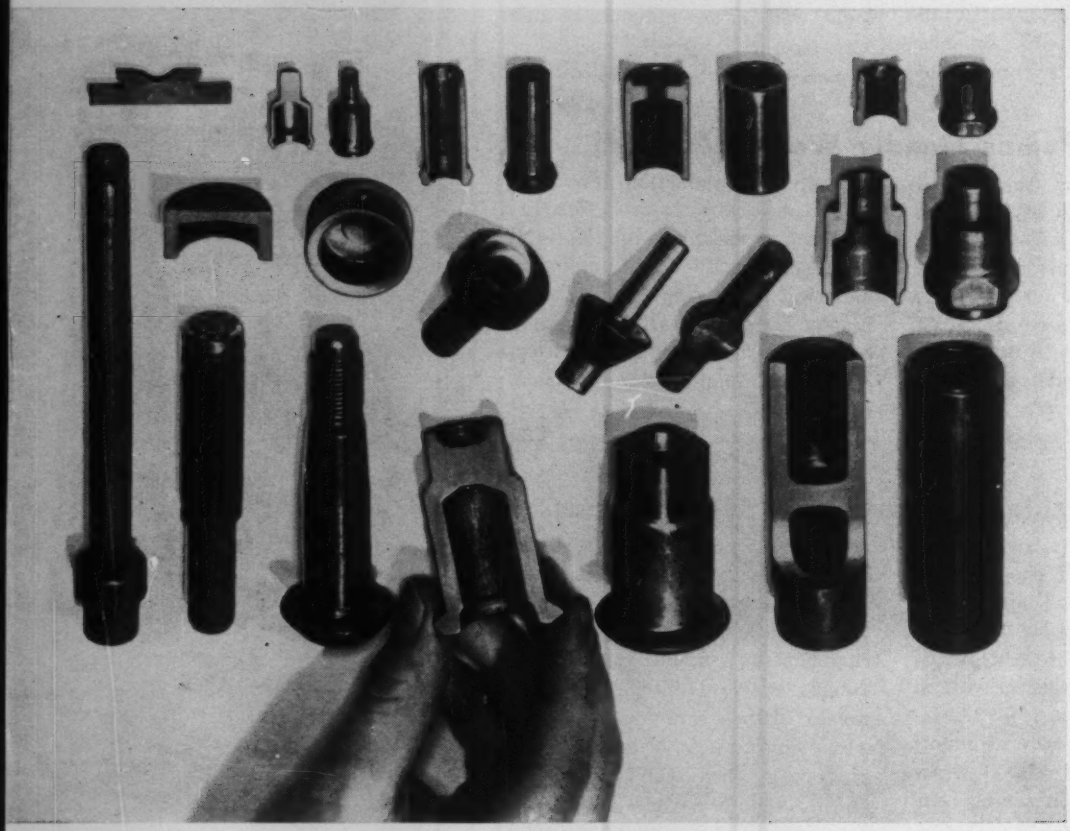


Differentially-coupled, a pair of clutches has an integral, anti-backlash brake. The input shaft, the output shaft and the 1.062-in. diam mounting pilot are all at one end. The 0.375-in. diam input shaft may be driven in one direction continuously. The 0.187-in. diam output shaft remains stationary or is driven in either direction. This depends on which of the three sets of terminals are electrically energized. In the event of a power failure, the brake unit locks the output shaft to the housing with a zero backlash grip. Molybdenum disulphide, impregnated sleeve bearings throughout, give smooth operation. Coil terminations are made inside the unit to eliminate accidental damage. (Marketing Computers, Inc.)

For more data circle No. 28 on postcard, p. 57

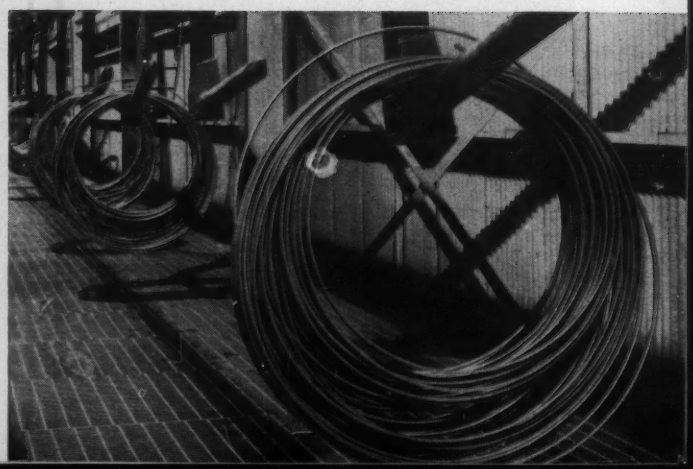
From the industry's most advanced bar mill . . .

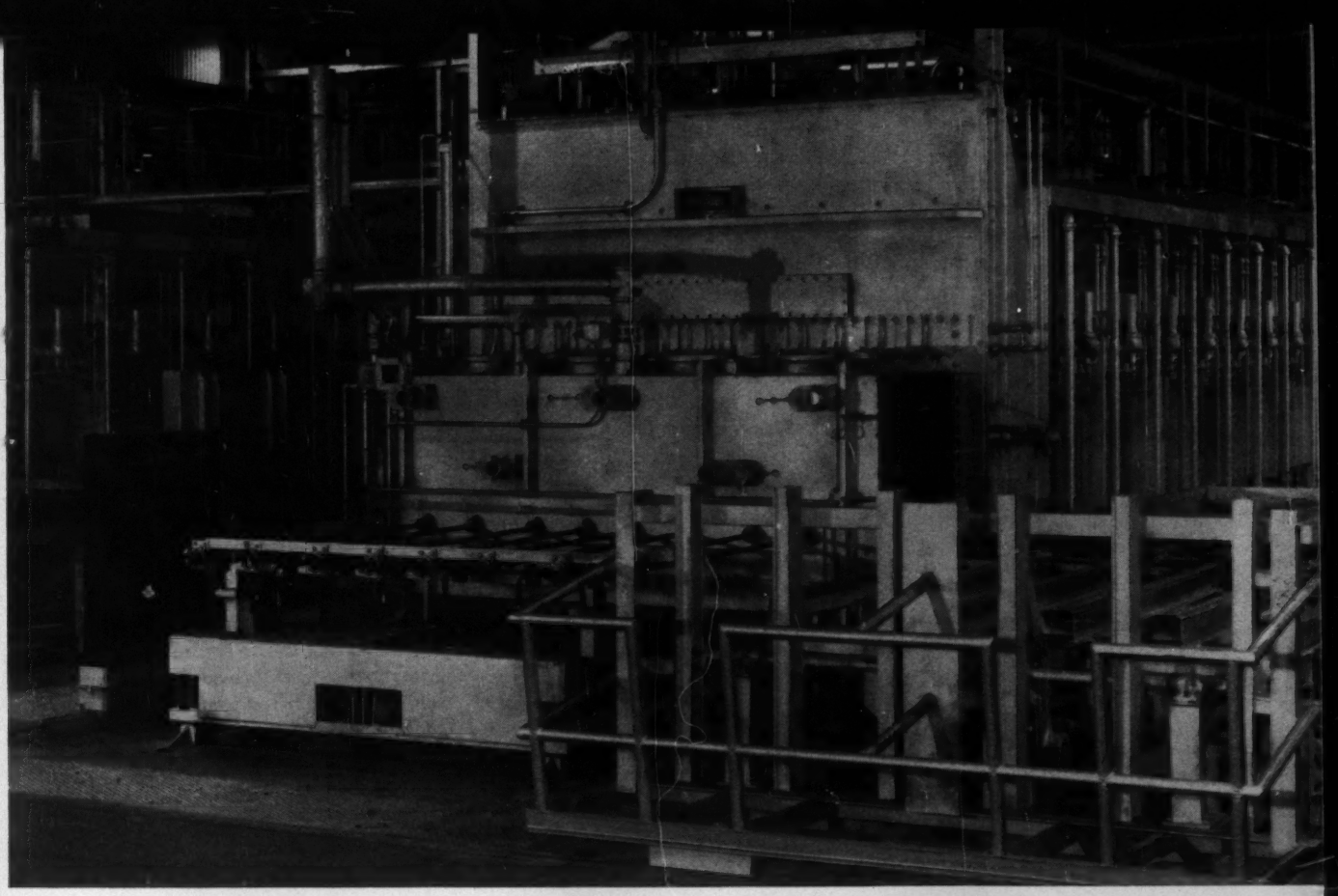
REPUBLIC STEEL FOR COLD EXTRUSION



THE COLD EXTRUSION PROCESS virtually eliminates raw material waste. Standard equipment is available so that retooling costs are not excessive. Bars produced on this 11″ mill have denser, more uniform structures because they undergo more hot work. A larger than usual billet—3″ or 4″ square—is rolled to finished products of standard sizes.

HEAVIER COILS weighing up to 1600 pounds mean fewer fabrication changeovers, less scrap loss. High speed coilers handle the complete range of bars produced (⅜″ to 39/64″—700 to 900 pounds; ⅝″ to 1½″—1400 to 1600 pounds). Each coil undergoes ultra-precise inspection to assure conformance to specifications, then is double banded for safe, efficient handling.





Annealed, normalized, or spheroidized to your precise specifications

Atmosphere controlled, continuous annealing furnaces give Republic's new 11″ bar mill maximum annealing capacity. Steel for cold extrusion or cold heading can be furnace-treated, finished, and delivered to your precise specifications. The mill has facilities to pickle, oil, lime, or phosphate coat.

Depending on the nature of your product, you may find it more advantageous to use steel in the cold finished form. Either way, our metallurgists will help you select and apply the most economical bar product—carbon, alloy, or stainless—capable of meeting your requirements.

Republic Steel is the nation's largest producer of steel for cold extrusion. For complete data, contact your nearest Republic representative or mail the coupon below. Please indicate if you would like a metallurgist to call.

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☐ Steel for cold forging ☐ Have a metallurgist call

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

Moisture Extractor

For the users of air tools and equipment, a unit provides filtered moisture-free air. This is done by centrifugal action created by a turbine at the inlet of the unit. Dry

air is directed through a 40-micron filter on its way to tool or equipment. The device is 4½-in. high and 2½-in. round. (Carlson Products, Inc.)

For more data circle No. 29 on postcard, p. 57

Resinoid Disk Wheels

Made from abrasive grain and resinoid bond, depressed-center disk wheels have triple reinforcement for greater safety, strength and durability. They are designed for fast grinding action wherever quick metal removal is required. The wheels come in 6- and 9-in. diam. Depressed center hole is ⅞ in. (Atlantic Abrasive Corp.)

For more data circle No. 30 on postcard, p. 57

Collet Actuator

Uniform and controlled holding pressure, regardless of variations in chucking diameter, is one of the salient features of a collet actuator. It has single-acting air cylinder and spring return. The device actuates the manufacturer's chuck, drawback collets, step chucks, expanding arbors and collets; or any holding device which requires a pull-back action to operate it. It also finds use on small high-speed lathes, precision boring machines, grinders, speed lathes and gear cutters. (Power Grip, Inc.)

For more data circle No. 31 on postcard, p. 57

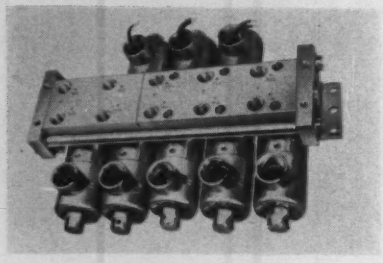
Scanner System

A combination of electronic timer and photoelectric scanner provides multiple programming sequences. It also offers adjustable delay and hold-in times and provision for light or dark operation. It provides a scanning range from 2 in. to 18 ft. (Farmer Electric Products Co., Inc.)

For more data circle No. 32 on postcard, p. 57

Multiple Subplates

Mounted as single integrated units, pneumatic and hydraulic control systems can be readily designed

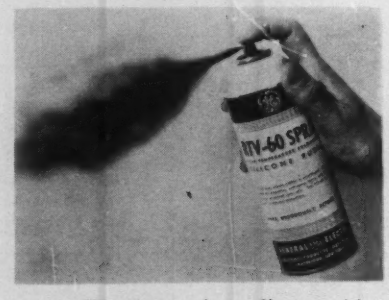


to include multi-valve stations. These plates offer unlimited manifold mounting of the manufacturer's solenoid valves in one location. Many valves can function as one unit. The plates are completely corrosion-resistant. End plates, mounting legs and spacers are constructed of aluminum. Tie rods are cadmium plated steel. (Versa Products Co., Inc.)

For more data circle No. 33 on postcard, p. 57

Silicone Rubber Spray

In aerosol spray form, a silicone rubber vulcanizes at room tempera-



ture. The aerosol applies a thin, uniform encapsulating coating on parts. It also finds use as a spray coating for easy release for molded plastic parts. The rubber, in aerosol spray form, possesses all of the desirable properties of conventional liquid silicone rubber. It resists temperatures from —65° to 600°F. It resists many solvents and is unaffected by ozone. (General Electric Co.)

For more data circle No. 34 on postcard, p. 57

Heavy-Duty Coolant

For heavy-duty machining, a water-soluble base is high in both sulphur and chlorine. It provides anti-weld and many pressure properties which insure high finish and extended tool life. When mixed with water, the base provides a stable emulsion, even for long periods of continued use. It is recommended for machining of tough alloy steels; for threading, tapping and also as a stamping and drawing compound. (E. F. Houghton & Co.)

For more data circle No. 35 on postcard, p. 57

Tool Balancers

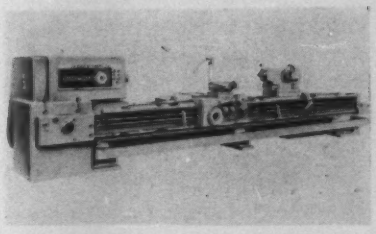
Pneumatic tool balancers eliminate accidental tool droppage. With the balancers, tools are out of the way, but within easy reach. The bal-

ancer is completely portable for use anywhere in the shop. It hooks easily into an overhead beam. The balancers feature: fast reel return, easy tension adjustment, safety declutching, straightline action and no-bind operation. (The Airetool Mfg. Co.)

For more data circle No. 36 on postcard, p. 57

New Equipment and Machinery

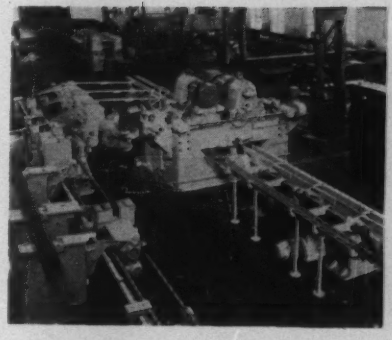
Engine Lathe Offers Extra Capacity and Power



Expressly suited to the requirements of ceramic tooling, an engine lathe has three speed ranges of 32 speeds. They are: 8-1016 rpm in the standard range, 10-1246 in the intermediate range and 12-1528 rpm in high range. Base length is 48 in. The lathe features preselected automatic shifting; four-way power rapid traverse for carriage movement. (The Lodge & Shipley Co.)

For more data circle No. 37 on postcard, p. 57

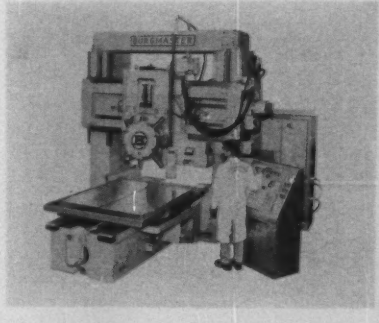
Bar Turning, Straightening Unit Also Polishes



For automatic operation with one operator, a centerless bar turning, straightening and polishing machine removes the roughskin from bars. It turns the black into bright bars of finished size. Fitted with an automatic loading and discharging device, the peeled bar is transported into the straightening and polishing machine. This machine has two vertically arranged straightening rolls, one on top of the other. They are driven independently. In order to get the best straightening possible, the angle of the straightening rolls is adjustable. With this type machine, exact straightening is possible from end to end. (Straus-Artys Corp.)

For more data circle No. 38 on postcard, p. 57

Tape-Controlled Machine Drills, Taps and Bores



An eight-spindle turret drilling, tapping and boring machine utilizes double-housing, planer-type construction. This achieves greater work capacity for fully-automatic machining on large workpieces. The table has a 62- x 65-in. machined surface. The X-axis table travel is 60 in. The Y-axis spindle slide travel is 48 in. Maximum clearance of the spindle nose over the table is 39 in. Distance between columns is 68½ in. Pre-selective speeds are infinitely variable. Twenty - four speeds range from 70-2400 rpm with a 15-hp, four-speed motor. The machine can also come with three-axis automatic depth control by tape. (Burg Tool Mfg. Co.)

For more data circle No. 39 on postcard, p. 57

Hole Machine Pinpoints "Locations" Quickly

Handling bars of all types, a hole machine produces very accurate pre-set tooled boring bars. It accurately locates and machines any combination of single or multiple precision tooling applications. The machine offers built-in quality control. Its pivot point is dead center of the center line of the spindle bar as well as the work holding fixture, at all times. A simple mathematical calculation, along the center line of the bar involved, establishes the initial pickup for machining. All the tooling for the machine is zeroed in to the fixture face. With this, it is possible to run whole groups of boring bars through the machine without changing the pickup. Special fixtures, attached to vertical and horizontal moving slides, hold the work. (De-Vlieg Machine Co.)

For more data circle No. 40 on postcard, p. 57

New marketing assistance for

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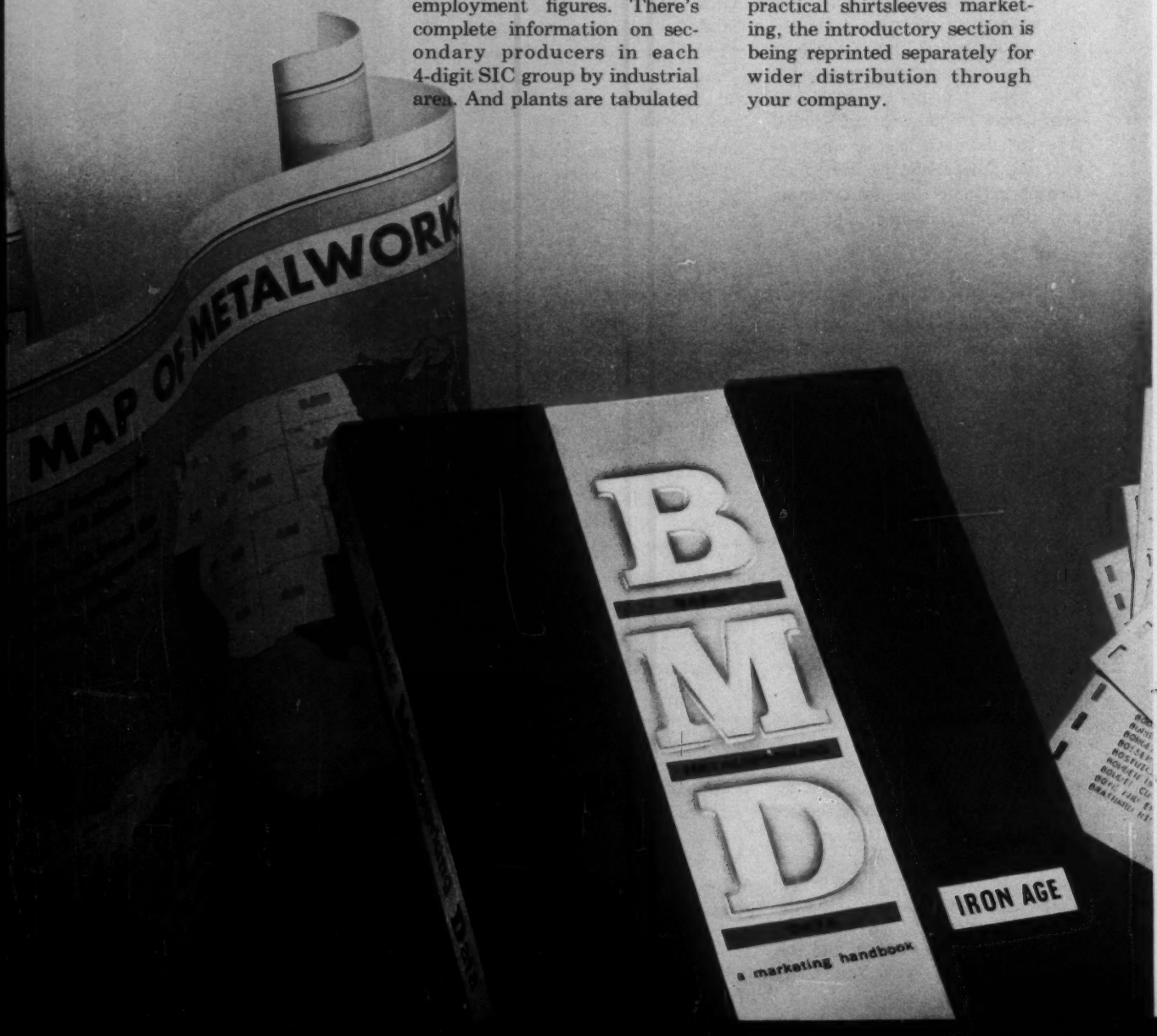

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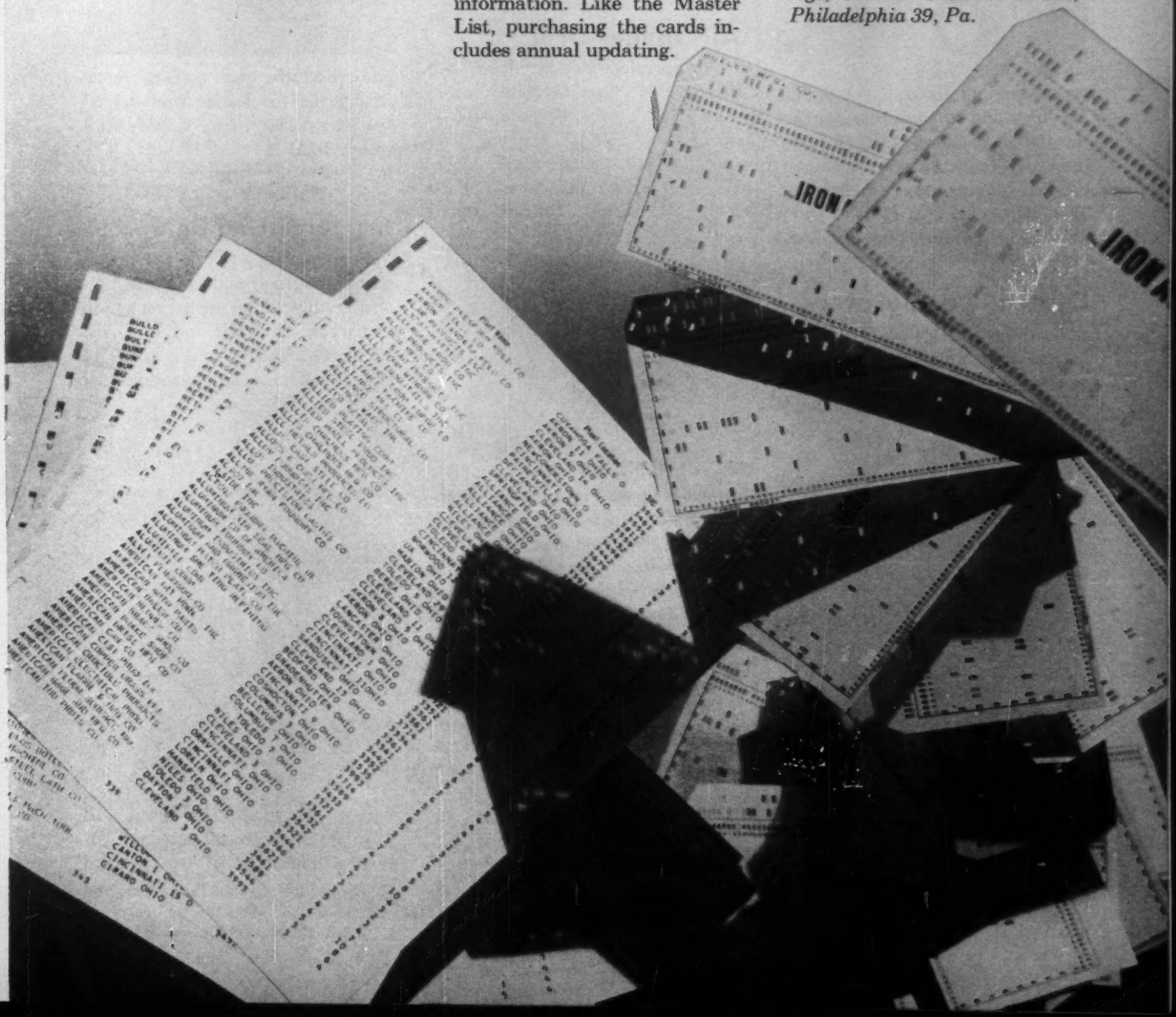


Mounting Press

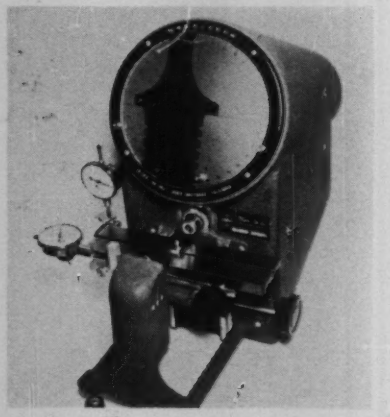
Either bakelite or transoptic materials may be compression mounted in a mounting press. In addition, this unit can use premolds. As part of the basic structure, the hydraulic

system permits its compact design. The high and low pressure connections, high pressure gage and pump intake hydraulic lines are easily accessible for any possible servicing. This also holds true for the pump and valve assembly. (Buehler Ltd.)

For more data circle No. 41 on postcard, p. 57

Optical Comparator

For in-process quality control, an optical comparator permits decentralization of quality control and inspection to numerous points of



manufacture. It provides 20 power magnification for precise visual inspection of details of components. These parts may range in size from microminiature parts to 3-in. fittings and contours of cutting or forming tools. A brilliant 8-in. screen permits viewing under normal room lighting. (Micro Vu)

For more data circle No. 42 on postcard, p. 57

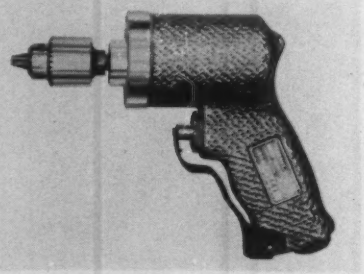
Drill Presses

A 17-in. drill press line features an internal depth stop. This permits stopping of the pinion at any pre-set depth within the full 5-in. spindle travel range. Attached is a depth gage. It's calibrated down to 1/16 in. and magnified 2:1 for easy reading. This depth stop eliminates quill, spindle and cutting tool deflection. "Front-of-the-machine" convenience provides a push-button control. (Walker-Turner Div., Rockwell Mfg. Co.)

For more data circle No. 43 on postcard, p. 57

Air Sander-Drill

Air-operated, a dual-purpose drill delivers ¼ hp. Operated as a sander, the device uses standard 4-in. disks or buffers. It does metal sanding, sheet metal buffing, deburring and light weld scaling. Used as a drill, the unit takes any stand-

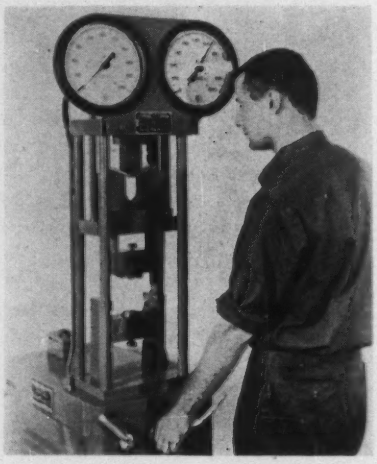


ard drill up to ¼ in. It is recommended for light sheet metal, galvanized, aluminum sheet or tubing, and asbestos sheet. Directed air exhaust blows away dust and chips as operator works. It keeps the job dirt free. (Superior Pneumatic & Mfg., Inc.)

For more data circle No. 44 on postcard, p. 57

Testing Machine

Tensile, compression and guided bend tests can all be made on a single machine. The base of the tester holds the motor and hydraulic power unit. The controls are on the front of the machine. The unit has a capacity of 10,000 lb. It has two gages to register the load applied in two ranges. The fixture consists of a punch secured to the underside of the upper platen and a die mounted on the middle platen by means of two locating

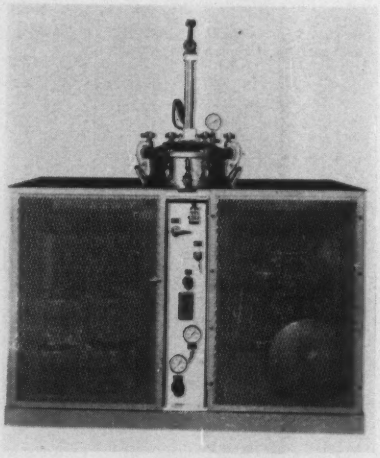


pins. Fixtures are quickly interchangeable for testing butt-welded specimens. (Steel City Testing Machines Inc.)

For more data circle No. 45 on postcard, p. 57

Impregnating Unit

For sealing powdered metal parts, a method and corollary unit also readily adapts to impregnation of carbon, electrical and small die cast parts. The process consists of a self-contained impregnating unit



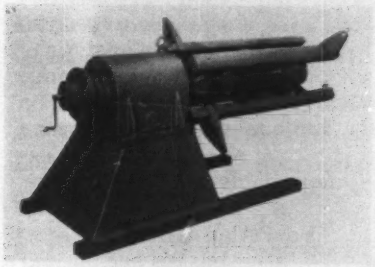
which uses a specially-formulated resin. Powdered metal parts, regardless of density, can be rendered pressure-tight and non-absorbing

with this unit. Impregnants and types of parts can be changed at will. (National Sinter-Seal Co.)

For more data circle No. 46 on postcard, p. 57

Uncoiler, Recoiler

Sheet metal uncoiler and recoiler machines have four self-centering arms of welded steel. They expand from 18-24 in. diam. A turning crank operates them. Total expansion requires about 22 turns. The

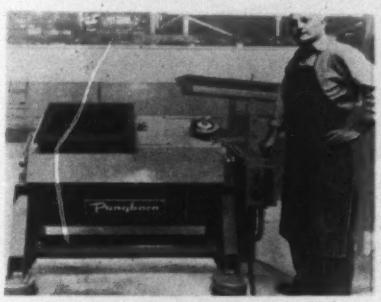


recoiler has a drum consisting of four 90° sectors with about 1-in. space between them. Expanded diameter is 22 in. (F. A. Woehr Machine Corp.)

For more data circle No. 47 on postcard, p. 57

Vibratory Finisher

Compact and self-contained, a vibratory finishing machine has a work capacity of 1½ cu ft. It is suitable for a variety of applications on metal, plastic and ceramic



items. The unit also has a mechanical motion control for infinite variation of frequency over the available range while the machine is running. The rubber-lined work container holds up to 500 lb of media and workpieces. (Pangborn Corp.)

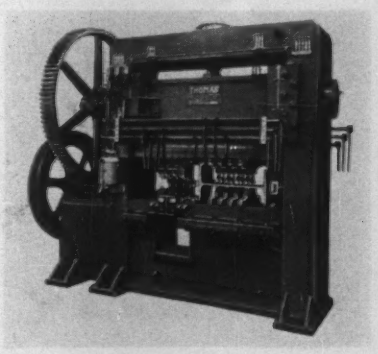
For more data circle No. 48 on postcard, p. 57

Pellet Loadout System

For pelletized iron ore, a loadout system electronically weighs, records and loads railroad cars. The system consists of two weigh hoppers with gates and actuating equipment, an instrumentation package and a calibration system. A conveyor system feeds the pellets into large surge bins. The surge bins have a "dribble" feed feature. This permits "topping off" the weigh hoppers for maximum efficiency of the system. Discharge chute positioning gives an even load distribution in the railroad car. (Gilmore Industries, Inc.)

For more data circle No. 49 on postcard, p. 57

Punches Beams



All-steel, closed frame multiple punches accomplish web and flange punching of beams from 3-36 in. wide flange. Offered in 150-225 and 300-ton capacities, the machines will also accommodate angles, channels, tees and wide plate punching. The compact design of the machines features rugged steel construction, air electric clutch operation, air counter balance, antifriction bearings and ductile iron gears. (Thomas Machine Mfg. Co.)

For more data circle No. 50 on postcard, p. 57

PATENT REVIEW

New Patents In Metalworking

Hardening Stainless

Method for hardening chromium-nickel stainless steel, P. M. Allen (assigned to Armco Steel Corp., a corp. of Ohio), Nov. 1, 1960. In the hardening of chromium-nickel stainless steel, the steel is annealed and formed into articles. The articles are then conditioned at 1000-1200°F., refrigerated and finally reheated at 700-1150°F. No. 2,958,618.

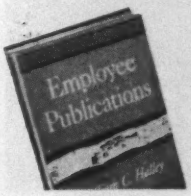
Low-Aluminum Alloy

Precipitation-hardenable, aluminum-containing iron base alloy, W. J. Buehler and C. G. Dalrymple (assigned to U. S. Sec. of the Navy), Nov. 15, 1960. A low-aluminum, precipitation-hardenable alloy comprises 8-12 pct Al, 1-3.5 pct Ti and the remainder essentially all Fe. No. 2,960,401.

Low-Nitrogen Steel

Method of making steel low in nitrogen, R. F. Graef (assigned to Huttenwerk Oberhausen A. G., Oberhausen, Germany), Nov. 8, 1960. In the drum refining of steel, the molten pig iron is rotated in the drum. At the same time, oxygen-enriched air is admitted below the surface of the bath, and ordinary non-heated air is admitted into the space above the bath. No. 2,959,-479.

Copies of U. S. Patents are available at 25¢ each from Commissioner of Patents, Washington 25, D. C.



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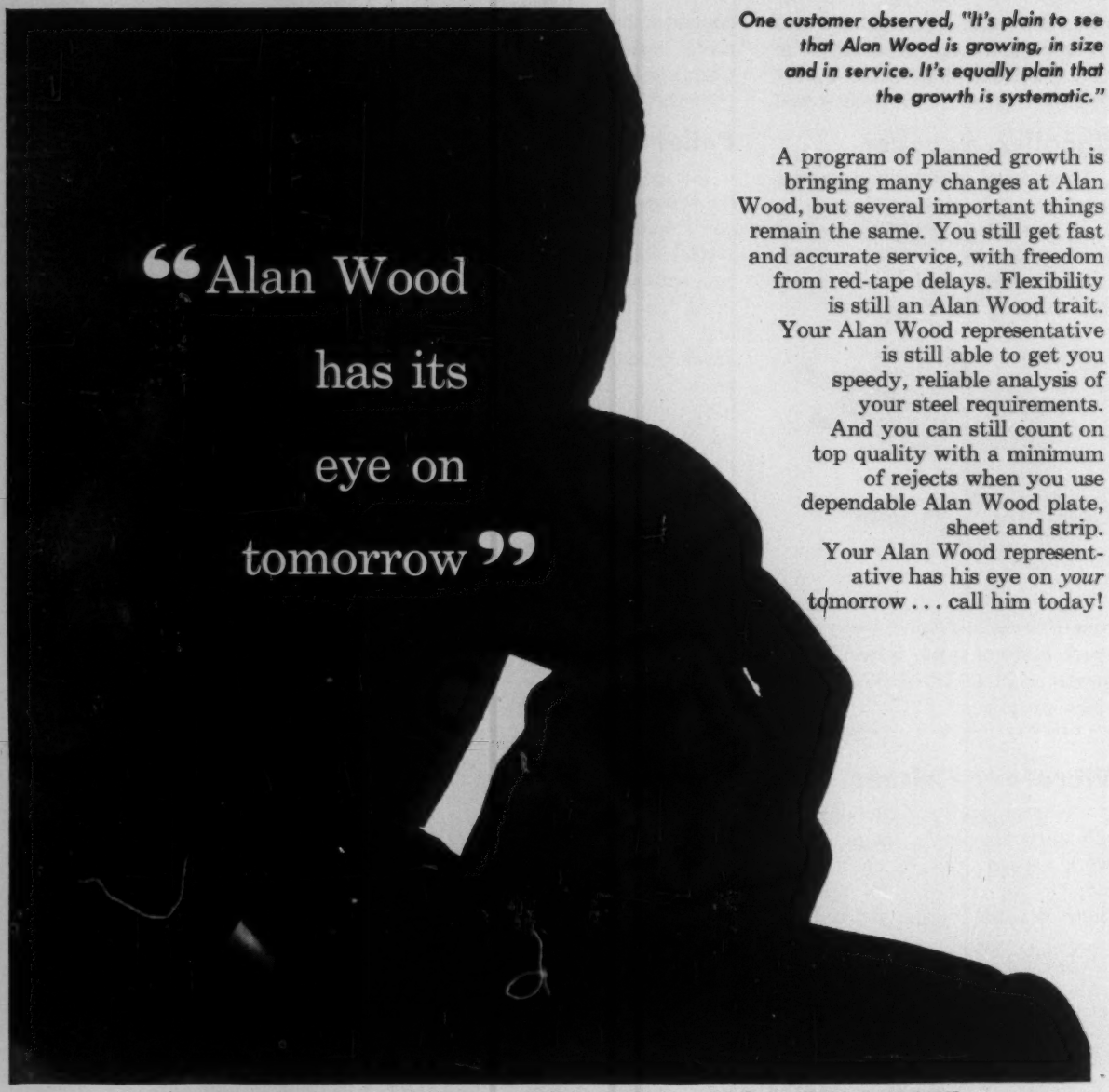

One customer observed, "It's plain to see that Alan Wood is growing, in size and in service. It's equally plain that the growth is systematic."

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Shakeout Complete as 1960 Ends

Inventory cutbacks and other artificial factors have been eliminated from the steel market.

The industry looks to a realistic flow of orders based on actual consumption or production planning of major steel users.

■ The end of 1960 should see the shakeout of the steel market completed. This means that with the start of 1961, the industry will be free of artificial factors in the market and will reflect the true level of business activity.

For this reason, January orders and output will have more than usual importance. After-the-first-of-the-year activity will supply the first real indications of the extent or depth of the business slowdown.

January Hopes—And, the month could disclose some idea of the date of the upturn.

As it stands now, January will be an improvement from the shakeout month of December. Just how much is the question. The January outlook has taken several turns within the past ten days, but the best evaluation is a moderate rise in activity.

End of an Era—It will be difficult to measure immediate trends of the industry until observers become familiar with the new indexes and tonnage figures which will be released by the American Iron and Steel Institute. The familiar operating rate which measured output as a percent of industry capacity will be discontinued after the first of the year.

Instead, a set of indexes based on the 1957-59 period, weekly tonnage figures, and year-to-date totals and comparisons will be issued by the Institute. The weekly operating rate forecast will no longer be issued.

Pattern Varies—Going back to the January outlook, two weeks ago a brisk improvement was expected. Then, more automotive cutbacks clouded the picture. But in the days immediately preceding the Christmas holiday, some new life in terms of a flurry of small orders gave the industry a better feeling. Some scheduled shutdowns were even canceled or shortened.

However, January can not be called a recovery month. Any real upturn, that is, to what is now considered about 60 percent of capacity, is not likely until March.

November Levels—The present rate of new orders, in spite of the recent ups and downs, is on a par with November. The industry may have to be content with less than hoped-for operations in the early months of the year. However, realists had for some time written off the early part of the year as a recovery period.

But steelmakers are relatively free from inventory cutbacks now, although they have been saying that for some months. Steel operations will now follow very closely the plans of steel consumers, without the peaks and valleys of previous years when users built, or cut back their stocks as much on their estimates of the steel market as their own.

Steel operations will close out 1959 at the lowest level since the 1930's, a gloomy farewell to the operating rate. Shutdowns and poor business brought the operating rate down to 39.2 pct of capacity.

Steel Output, Composite Prices

Production	This Week	Week Ago	Month Ago	Year Ago
(Net tons, 000 omitted)	1,117†	1,335	1,393	2,726
Ingot Index				
(1947-1949=100)	69.4†	83.1	86.7	169.7
Composite Prices				
Finished Steel, base (cents per lb)	6.196	6.196	6.196	6.196
Pig Iron (Gross ton)	$66.32	$66.32	$66.32	$66.41
Scrap No. 1 hvy (Gross ton)	$29.17	$28.50	$28.50	$41.17
No. 2 bundles	$19.17	$18.83	$18.50	$27.83

Steel Output, Operating Rates

	This Week	Last Week	Month Ago	Year Ago
North East Coast	41.0†	45.0	51.0	102.0
Buffalo	34.0†	40.0	45.0	100.0
Pittsburgh	30.0†	48.0	46.0	98.0
Youngstown	20.0†	36.0	37.0	94.0
Cleveland	42.0†	40.0	50.0	98.0
Detroit	52.0†	57.0	61.0	105.0
Chicago	45.0†	52.0	52.0	94.0
Cincinnati	53.0†	55.0	50.0	95.0
St. Louis	49.0†	61.0	61.0	110.0
South	58.0†	55.0	55.0	91.0
West	49.0†	50.0	48.0	93.0
U. S. Rate	39.2†	46.9	48.9	96.3

*Revised. †Iron Age Estimate
Source: American Iron And Steel Institute

PA Relies on Sales Forecasts

William J. McCabe, purchasing agent for Eastern Rolling Mills, says sales forecasts can supply the basis for maintaining adequate inventories.

At least this is the system that he finds successful.

■ How should a small metal fabricator, with limited capital, which must compete with some of the major metalworking corporations, purchase its primary metal?

Should it play the volatile market heavily in an attempt for a better cost picture—and run the risk of being wrong and thus severely crippled?

Or should it buy on a regular schedule—and take the chance of missing the boat in a falling market and wind up in an inferior competitive position?

Neither; yet both. So says William J. McCabe, purchasing agent for Eastern Rolling Mills, New York. Mr. McCabe buys primarily copper and copper-base alloys, and aluminum rerolling stock which Eastern converts into strip.

The System—His approach: Lean heavily on sales forecasts, made by the sales manager and his staff. In Eastern's case these are kept about three months in advance.

Mr. McCabe maintains a basic inventory, based on this, regardless of the condition of the primary metal markets. Traditionally this has been 4 to 6 weeks. He is now cutting this down to about three weeks.

He then adds to this, to a limit of three months' supply, depending on his appraisal of the market.

Open Rolling Time — Mr. McCabe warns against taking the current trend in inventory reduction by primary metal buyers at face value. "Now that business is soft," he says, "we have some open rolling time. We are taking advantage of this to convert some of our primary metal to standard gage strip. As soon as it is worked, it is no longer part of the inventory for which I am responsible."

He explains that this means his rate of inventory reduction must be balanced by the rate of buildup of semi-finished products to get the true picture.

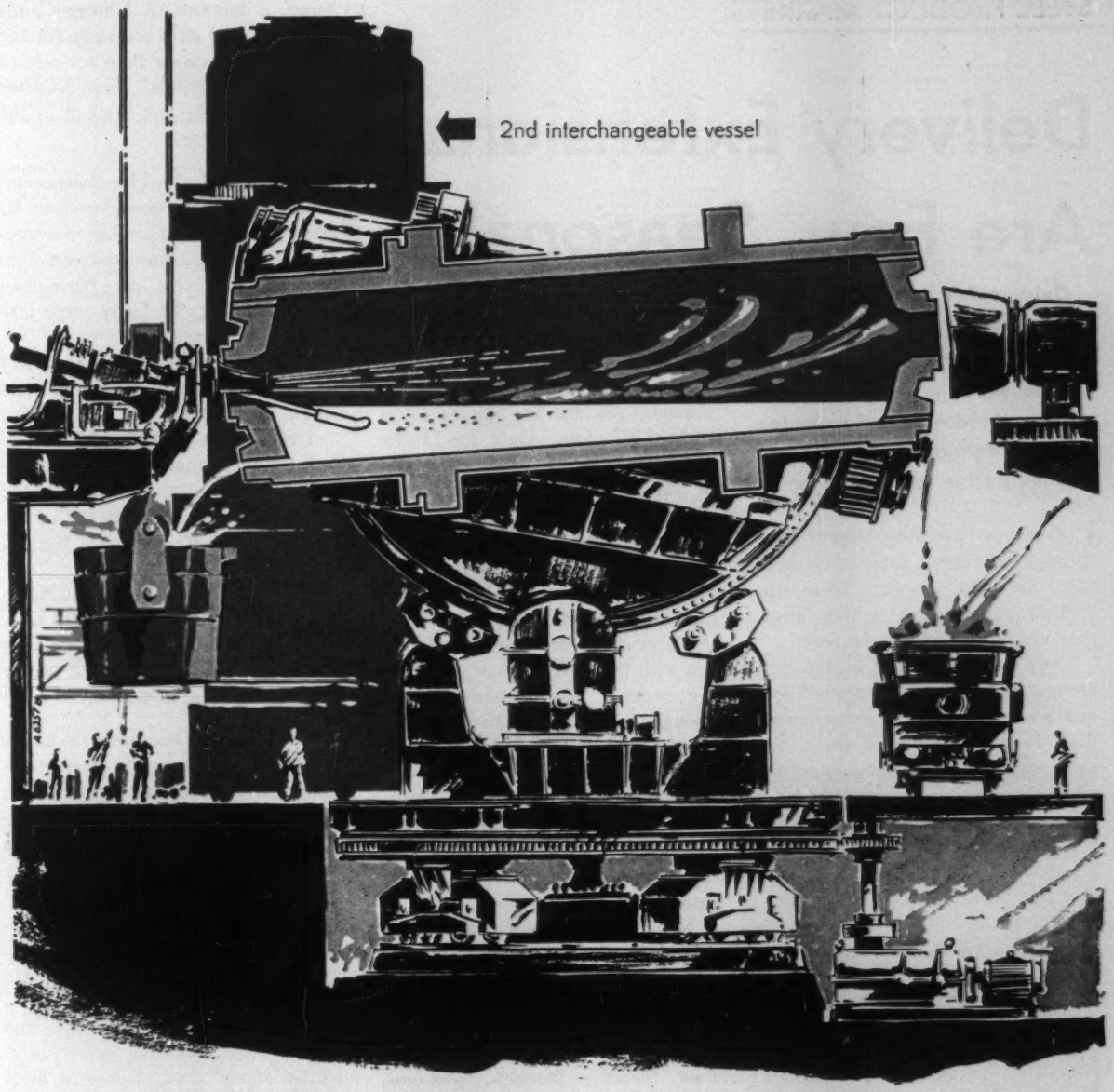
The Eastern purchasing agent also points to what may be another trend. Mr. McCabe is buying 70-30 brass and 85-15 brass made at a French mill. Why? "Strictly price," he says. "And the quality is exceptional."

Buys Regularly—But this is no on-again, off-again proposition. Eastern buys this metal on a regular basis. And Mr. McCabe says they get as good service as with any American-made item on his shopping list.

Will Eastern be buying more foreign metal? "Probably not," says the purchasing agent. First of all there is no price advantage for most primary shapes. Also, Eastern only buys foreign metal when it feels it must be competitive, and when it can get top quality and service.

The Future—What's ahead in the areas where Eastern competes? Aluminum price sheets for strip are meaningless, says Mr. McCabe. And the basic cause of the discounting—oversupply—will continue in 1961.

WILLIAM J. McCABE: "Don't take the trend at face value."



DEMAG

Cost-conscious Engineering

Among the latest methods of rational steel production is the Rotor Process in which hot metal is refined into steel of open-hearth quality with the help of oxygen. The furnace is mounted on a tilting cradle so that two interchangeable vessels can be employed. Production need thus not be interrupted when relining is necessary. DEMAG has designed and constructed to its own system plants of 75 to 100 ton capacity for European and overseas customers.

DEMAG AKTIENGESELLSCHAFT DUISBURG GERMANY

US-Representatives: American DEMAG Corporation, One Gateway Center, Pittsburgh 22, Pa

Delivery Extensions Are Few, Seasonal

Only a few districts report any extensions in steel mill delivery promises.

Even these are due more to holiday shutdowns and expected shipping delays due to weather than to better business.

■ Delivery promises have gone through only the mildest of changes over the past month. Mills still haven't returned to selling steel; they are selling speedy delivery.

Only two markets, Chicago and Detroit, have made any appreciable number of changes in extension of delivery promises. And these, for the most part, just move delivery promises into line with those in other markets.

The slightly longer deliveries now quoted are not necessarily due to any significant increase in the volume of business. It is due as much or more to extended shutdowns by mills for the holidays and an anticipation of weather problems at steel mill loading platforms.

Sheet and Strip—Buyers are still showing caution in placing sheet and strip orders. Only the largest users are placing orders very far in advance of delivery. And even in these cases mills can't be sure that the order is firm until it has been shipped as large users have been cancelling or cutting back orders at the last minute.

Users along the **East Coast** persist with their small-lot, rush delivery orders. The orders are just enough to fill inventory holes and keep production running while carrying minimum inventories.

A **Pittsburgh** sheet mill admits January won't put a strain on capacity. Indicated volume is 10 pct under the low point of the 1958 slump.

Mild January gains are still expected in the **Midwest.** For one thing, a number of **Chicago** mills say sheet and strip bookings for the month are stronger than for any of the past six months. Even so, they are less than 50 pct booked in the majority of cases.

Wire and Rod—The fastener industry is usually considered to be one of the metalworking barometers. Recently, some Midwest fastener manufacturers have been placing rush orders of fairly large size for rod and wire stock.

Chicago warehouses had a flurry a short time ago, indicating user stocks are very low.

Despite this year's poor second-half showing, some long-range forecasts by wire producers suggest the upturn is here. They say the industry will be on the comeback trail all through 1961.

Manufacturers wire is sharing in the seasonal dip. **Pittsburgh** mills are making delivery out of stock in less than a week. They can supply high carbon wire in two days.

Stainless—December hasn't shown any improvement over previous months, according to **Pittsburgh** stainless mills. However, the holiday period was expected to bring a letdown. Deliveries are still very short.

Delivery Promises at a Glance

	East	Pittsburgh	Cleveland	Detroit	Chicago	West Coast
CR Carbon Sheet	2–5 wks	2–4 wks	3–5 wks	3–4 wks	2–4 wks	4–5 wks
HR Carbon Sheet	2–4 wks	2–4 wks	1–3 wks	2–3 wks	2–3 wks	4 wks
CR Carbon Strip	2–5 wks	3–5 wks	3–5 wks	3–4 wks	2–3 wks	4 wks
HR Carbon Strip	2–4 wks	2–4 wks	1–3 wks	2–3 wks	2–3 wks	4 wks
HR Carbon Bars	1–4 wks	1–3 wks	1–4 wks	Stock–4 wks	Stock–3 wks	2–3 wks
CF Carbon Bars	1–4 wks	1–3 wks	Stock–4 wks	Stock–6 wks	1–4 wks	1–2 wks
Heavy Plate	1–3 wks	1–2 wks			2–3 wks	4 wks
Light Plate	1–3 wks	1–2 wks	1–3 wks		2–3 wks	3 wks
Merchant Wire	Stock	Stock	Stock		1–2 wks	2 wks
Oil Country Goods	Stock	Stock	Stock		Stock–1 wk	
Linepipe	Stock	1–4 wks	Stock		2–3 wks	4 wks
Buttweld Pipe	Stock	Stock	Stock	Stock	1–2 wks	Stock
Std. Structurals	1–4 wks	1–2 wks	1–4 wks	2–6 wks	1–2 wks	Stock–4 wks
CR Stainless Sheet	Stock–4 wks	Stock–3 wks	1–4 wks	Stock–4 wks		
CR Stainless Strip	Stock–4 wks	Stock–3 wks	1–4 wks	Stock–4 wks		

Armco Subsidiaries Merge With Parent

The National Supply Co. and Union Wire Rope Corp., wholly-owned subsidiaries of Armco Steel Corp., will be merged with the parent company on Dec. 31.

National Supply will be operated as the National Supply Div. of Armco. Union Wire will also be operated as a separate unit.

Pittsburgh-based National Supply is one of the largest manufacturers and distributors of oil field machinery and equipment. It has manufacturing plants in Pennsylvania, Texas, and California. In addition, it operates 120 oil field stores in North and South America.

Union Wire Rope has its headquarters and manufacturing plant at Kansas City, Mo.

COMPARISON OF PRICES

(Effective Dec. 27, 1960)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price changes from previous week are shown by an asterisk (*).

	Dec. 27 1960	Dec. 20 1960	Nov. 29 1960	Dec. 29 1959
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	5.10¢	5.10¢	5.10¢	5.10¢
Cold-rolled sheets	6.275	6.275	6.275	6.275
Galvanized sheets (10 ga.)	6.875	6.875	6.875	6.875
Hot-rolled strip	5.10	5.10	5.10	5.10
Cold-rolled strip	7.425	7.425	7.425	7.425
Plate	5.30	5.30	5.30	5.30
Plates, wrought iron	14.10	14.10	14.10	13.55
Stainl's C-R strip (No. 302)	52.00	52.00	52.00	52.00
Tin and Terneplate: (per base box)				
Tin plates (1.50 lb.) coke	$10.65	$10.65	$10.65	$10.65
Tin plates, electro (0.50 lb.)	9.35	9.35	9.35	9.35
Special coated mfg. ternes	9.90	9.90	9.90	9.90
Bars and Shapes: (per pound)				
Merchants bar	5.675¢	5.675¢	5.675¢	5.675¢
Cold finished bar	7.65	7.65	7.65	7.65
Alloy bar	6.725	6.725	6.725	6.725
Structural shapes	5.50	5.50	5.50	5.50
Stainless bars (No. 302)	46.75	46.75	46.75	45.00
Wrought iron bars	14.90	14.90	14.90	14.90
Wires: (per pound)				
Bright wire	8.00¢	8.00¢	8.00¢	8.00¢
Rails: (per 10 lb.)				
Heavy rails	$5.75	$5.75	$5.75	$5.75
Light rails	6.725	6.725	6.725	6.725
Semifinished Steel: (per net ton)				
Rerolling billets	$80.00	$80.00	$80.00	$80.00
Slabs, rerolling	80.00	80.00	80.00	80.00
Forging billets	99.50	99.50	99.50	99.50
Alloys, blooms, billets, slabs	119.00	119.00	119.00	119.00
Wire Rods and Skelp: (per pound)				
Wire rods	6.40¢	6.40¢	6.40¢	6.40¢
Skelp	5.05	5.05	5.05	5.05
Finished Steel Composite: (per pound)				
Base price	6.196¢	6.196¢	6.196¢	6.196¢

	Dec. 27 1960	Dec. 20 1960	Nov. 29 1960	Dec. 29 1959
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$70.11	$70.11	$70.11	$70.57
Foundry, South Cin'ti	71.92	71.92	71.92	73.87
Foundry, Birmingham	62.50	62.50	62.50	62.50
Foundry, Chicago	66.50	66.50	66.50	66.50
Basic, del'd Philadelphia	69.61	69.61	69.61	70.07
Basic, Valley furnace	66.00	66.00	66.00	66.00
Malleable, Chicago	66.50	66.50	66.50	66.50
Malleable, Valley	66.50	66.50	66.50	66.50
Ferromanganese, 74-76 pct Mn, cents per lb.‡	11.00	11.00	11.00	12.25
Pig Iron Composite: (per gross ton)				
Pig iron	$66.32	$66.32	$66.32	$66.41
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$27.50*	$26.50	$26.50	$42.50
No. 1 steel, Phila. area	33.50	33.50	33.50	41.50
No. 1 steel, Chicago	26.50*	25.50	25.50	39.50
No. 1 bundles, Detroit	23.50*	21.50	21.50	37.50
Low phos., Youngstown	29.50*	28.50	28.50	48.50
No. 1 mach'y cast, Pittsburgh	44.50	44.50	45.50	55.50
No. 1 mach'y cast, Phila.	47.50	47.50	47.50	54.50
No. 1 mach'y cast, Chicago	42.50*	41.50	41.50	60.50
Steel Scrap Composite: (per gross ton)				
No. 1 hvy. melting scrap	$29.17*	$28.50	$28.50	$41.17
No. 2 bundles	19.17*	18.83	18.50	27.83
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.75-15.50	14.75-15.50	14.50-15.50	14.75-15.50
Foundry coke, prompt	18.50	18.50	18.50	18.50
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	30.00	30.00	30.00	33.00
Copper, Lake, Conn.	30.00	30.00	30.00	33.00
Tin, Straits, N. Y.	101.50†	101.50	102.75	98.50
Zinc, East St. Louis	12.50	12.50	13.00	12.50
Lead, St. Louis	11.00	11.00	11.80	11.80
Aluminum, ingot	26.00	26.00	26.00	28.10
Nickel, electrolytic	74.00	74.00	74.00	74.00
Magnesium, ingot	36.00	36.00	36.00	36.00
Antimony, Laredo, Tex.	29.50	29.50	29.50	29.50

† Tentative. ‡ Average. ** Revised.

Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo and Birmingham.

Steel Scrap Composite

Average of No. 1 heavy melting steel scrap and No. 2 bundles delivered to consumers at Pittsburgh, Philadelphia and Chicago.

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*Appears in the Dec. 22-Jan. 5 issues.

QUANTITY PRODUCTION OF GREY IRON CASTINGS

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Market Firms, Prices Rise

Prices climbed in several key areas this week. The market is at its firmest level in recent months.

Most dealers are sitting on inventories.

■ Prices in several key areas rose slightly but surprisingly this week. In other areas prices remained stationary giving the market one of its finest tones in recent months.

Prices climbed in Cleveland, Pittsburgh, Chicago, and Detroit this week. Eastern port areas, especially Philadelphia and New York, continue to show very little domestic activity. But export is still firm in these areas.

Most scrapmen are sitting tight on inventories with hopes that prices will climb after the first of the year. Most consumers, however, appear in no hurry to order.

The IRON AGE composite price for No. 1 heavy melting rose this week from $28.50 to $29.17. The composite price for No. 2 bundles also rose. Last week it was $18.83; this week it's up to $19.17.

Pittsburgh — On the strength of industrial selling, the market moved up a notch this week. An extra lot of automotive scrap was sold for about $3 over the price paid at the start of the month. In sympathy, prices of dealer openhearth grades advanced $1. Price strength is still more a matter of tight supply rather than customer demand. Brokers say it has become impossible to buy at current levels. Bad weather has combined with low prices to slow yard collections. Reports of export competition continue to be heard from downriver points.

Chicago — In the face of strong mill resistance, broker buying and dealer buying prices continue to advance. One railroad sale this week was $3 over the price paid last month. However, a consumer order was written just prior to this slightly under present market prices. Crushers are reportedly stepping up purchases and paying stronger prices.

Philadelphia—Bad weather still has most of the activity in this market snarled. While a few ships continue to load and some dealers still draw prices at the dock above current levels, the market is generally dormant. Most scrapmen in the area appear to be sitting on inventories and waiting for first quarter action to raise prices.

New York — Export demand is holding up very well. But with the continued absence of domestic interest, there is little pressure for current prices to move in either direction.

Detroit—Prices climbed for the first time in several months. The strength came in No. 1 grades. The reason was a combination of continued good export interest and sudden mill activity. The upward move, however, was from an exceedingly low level to a low price level. Recent bargain prices were just too attractive for mills to resist any longer. Early upstate Michigan industrial lists for January are somewhat higher than this month. The same is expected for the Detroit area.

Cleveland—The market is up $1 on appraisal based on broker buying to cover old orders. Dealers have been quite bullish over the prospects for January buying by mills. While no orders are in sight yet to confirm prices, dealers will not let any tonnage go at the present levels.

Cincinnati—No local strength is in sight at all as one buyer continues out of the market and a second will be in only to a small extent. So, if out-of-area strength develops as expected next month, considerable up-river shipments will probably start.

St. Louis—The tone of the market remains firm. The feeling is that a bottom has been reached. However, dealings are slow and collections are at a standstill due to the extreme cold weather.

Birmingham—There was a little more activity in the market this week. Although individual orders were small, dealers looked on the buying as an indication that inventories are getting low.

Buffalo — Prices are unchanged in a dead market. Not much change is expected before spring. Dealer inventories are low and nothing is coming in.

Boston — A limited amount of export activity remains as the only sign of life in this market. Scrapmen are awaiting increased activity after the first of the year.

West Coast — In Los Angeles, San Francisco, and Seattle the domestic market is dormant. Due to the holidays, the flow of scrap is slow.

Houston — The domestic market is dead, but exports provide some activity here. Brokers are awaiting some word from the district mill regarding its plans for the first of the year.

SCRAP PRICES *(Effective Dec. 27, 1960)*

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Pittsburgh

No. 1 hvy. melting	$27.00 to $28.00
No. 2 hvy. melting	23.00 to 24.00
No. 1 dealer bundles	28.00 to 29.00
No. 1 factory bundles	33.00 to 34.00
No. 2 bundles	21.00 to 22.00
No. 1 busheling	27.00 to 28.00
Machine shop turn.	11.00 to 12.00
Shoveling turnings	16.00 to 17.00
Cast iron borings	15.00 to 16.00
Low phos. punch'gs plate	34.00 to 35.00
Heavy turnings	23.00 to 24.00
No. 1 RR hvy. melting	32.00 to 33.00
Scrap rails, random lgth	40.00 to 41.00
Rails 2 ft. and under	45.00 to 46.00
RR Specialties	38.00 to 39.00
No. 1 machinery cast.	44.00 to 45.00
Cupola cast.	35.00 to 36.00
Heavy breakable cast.	33.00 to 34.00
Stainless	
18-8 bundles and solids	175.00 to 180.00
18-8 turnings	95.00 to 100.00
430 bundles and solids	85.00 to 90.00
410 turnings	60.00 to 65.00

Chicago

No. 1 hvy. melting	$26.00 to $27.00
No. 2 hvy. melting	24.00 to 25.00
No. 1 dealer bundles	26.00 to 27.00
No. 1 factory bundles	30.50 to 31.50
No. 2 bundles	17.00 to 18.00
No. 1 busheling	26.00 to 27.00
Machine shop turn.	12.00 to 13.00
Mixed bor. and turn.	14.00 to 15.00
Shoveling turnings	14.00 to 15.00
Cast iron borings	14.00 to 15.00
Low phos. forge crops	36.00 to 37.00
Low phos. punch'gs plate, ½ in. and heavier	33.00 to 34.00
Low phos. 2 ft. and under	31.50 to 32.50
No. 1 RR hvy. melting	29.00 to 30.00
Scrap, rails, random lgth	37.00 to 38.00
Rerolling rails	50.00 to 51.00
Rails 2 ft. and under	42.00 to 43.00
Angles and splice bars	38.00 to 39.00
RR steel car axles	50.00 to 51.00
RR couplers and knuckles	35.00 to 36.00
No. 1 machinery cast.	42.00 to 43.00
Cupola cast.	37.00 to 38.00
Cast iron wheel	28.00 to 29.00
Malleable	41.00 to 42.00
Stove plate	32.00 to 33.00
Steel car wheels	36.00 to 37.00
Stainless	
18-8 bundles and solids	165.00 to 170.00
18-8 turnings	85.00 to 90.00
430 bundles and solids	80.00 to 85.00
430 turnings	45.00 to 50.00

Philadelphia Area

No. 1 hvy. melting	$33.00 to $34.00
No. 2 hvy. melting	27.00 to 28.00
No. 1 dealer bundles	33.00 to 34.00
No. 2 bundles	18.00 to 19.00
No. 1 busheling	34.00 to 35.00
Machine shop turn.	12.00 to 13.00
Mixed bor. short turn.	14.00 to 15.00
Cast iron borings	14.00 to 15.00
Shoveling turnings	18.00 to 19.00
Clean cast. chem. borings	23.00 to 24.00
Low phos. 5 ft and under	35.00 to 36.00
Low phos. 2 ft punch'gs	38.00 to 39.00
Elec. furnace bundles	34.00 to 35.00
Heavy turnings	25.00 to 26.00
RR specialties	36.00 to 37.00
Rails, 18 in. and under	47.00 to 49.00
Cupola cast.	36.00 to 37.00
Heavy breakable cast.	36.00 to 37.00
Cast iron car wheels	37.00 to 38.00
Malleable	45.00 to 46.00
No. 1 machinery cast.	47.00 to 48.00

Cincinnati

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$23.50 to $24.50
No. 2 hvy. melting	20.50 to 21.50
No. 1 dealer bundles	24.50 to 25.50
No. 2 bundles	16.00 to 17.00
Machine shop turn.	8.00 to 9.00
Shoveling turnings	10.00 to 11.00
Cast iron borings	10.00 to 11.00
Low phos. 18 in. and under	31.00 to 32.00
Rails, random length	33.00 to 34.00
Rails, 18 in. and under	42.00 to 43.00
No. 1 cupola cast.	34.00 to 35.00
Heavy breakable cast.	28.00 to 29.00
Drop broken cast.	41.00 to 42.00

Youngstown

No. 1 hvy. melting	$27.00 to $28.00
No. 2 hvy. melting	21.00 to 22.00
No. 1 dealer bundles	27.00 to 28.00
No. 2 bundles	20.00 to 21.00
Machine shop turn.	13.00 to 14.00
Shoveling turnings	16.00 to 17.00
Low phos. plate	29.00 to 30.00

Cleveland

No. 1 hvy. melting	$24.50 to $25.50
No. 2 hvy. melting	17.00 to 18.00
No. 1 dealer bundles	24.50 to 25.50
No. 1 factory bundles	29.00 to 30.00
No. 2 bundles	16.50 to 17.50
No. 1 busheling	24.50 to 25.50
Machine shop turn.	10.00 to 11.00
Mixed bor. and turn.	13.00 to 14.00
Shoveling turnings	13.00 to 14.00
Cast iron borings	13.00 to 14.00
Cut structural & plates, 2 ft. & under	33.50 to 34.50
Low phos. punch'gs plate	25.50 to 26.50
Drop forge flashings	24.50 to 25.50
Foundry steel, 2 ft. & under	25.00 to 26.00
No. 1 RR hvy. melting	29.50 to 30.50
Rails 2 ft. and under	45.00 to 46.00
Rails 18 in. and under	46.00 to 47.00
Steel axle turnings	21.00 to 22.00
Railroad cast.	44.00 to 45.00
No. 1 machinery cast.	44.00 to 45.00
Stove plate	37.00 to 38.00
Malleable	44.00 to 45.00
Stainless	
18-8 bundles	165.00 to 170.00
18-8 turnings	60.00 to 70.00
430 bundles	70.00 to 75.00

Buffalo

No. 1 hvy. melting	$23.00 to $24.00
No. 2 hvy. melting	20.00 to 21.00
No. 1 busheling	23.00 to 24.00
No. 1 dealer bundles	23.00 to 24.00
No. 2 bundles	17.00 to 18.00
Machine shop turn.	9.00 to 10.00
Mixed bor. and turn.	10.00 to 11.00
Shoveling turnings	13.00 to 14.00
Cast iron borings	11.00 to 12.00
Low phos. plate	31.00 to 32.00
Structurals and plate, 2 ft. and under	33.00 to 34.00
Scrap rails, random lgth	32.00 to 33.00
Rails 2 ft. and under	42.00 to 43.00
No. 1 machinery cast.	42.00 to 43.00
No. 1 cupola cast.	36.00 to 37.00

St. Louis

No. 1 hvy. melting	$27.00 to $28.00
No. 2 hvy. melting	25.00 to 26.00
Foundry steel, 2 ft.	27.00 to 28.00
No. 1 dealer bundles	28.00 to 29.00
No. 2 bundles	18.00 to 19.00
Machine shop turn.	7.00 to 8.00
Shoveling turnings	9.00 to 10.00
Cast iron borings	16.00 to 17.00
No. 1 RR hvy. melting	29.00 to 30.00
Rails, random lengths	34.00 to 35.00
Rails, 18 in. and under	36.00 to 37.00
RR specialties	35.00 to 36.00
Cupola cast.	38.00 to 39.00
Heavy breakable cast.	31.00 to 32.00
Stove plate	33.00 to 34.00
Cast iron car wheels	33.00 to 34.00
Rerolling rails	47.00 to 48.00
Unstripped motor blocks	33.00 to 34.00

Birmingham

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	24.00 to 25.00
No. 1 dealer bundles	29.00 to 30.00
No. 2 bundles	19.00 to 20.00
No. 1 busheling	31.00 to 32.00
Machine shop turn.	16.00 to 17.00
Shoveling turnings	18.00 to 19.00
Cast iron borings	9.00 to 10.00
Electric furnace bundles	32.00 to 33.00
Elec. furnace, 3 ft. & under	32.00 to 33.00
Bar crops and plate	37.00 to 38.00
Structural and plate, 2 ft.	36.00 to 37.00
No. 1 RR hvy. melting	32.00 to 33.00
Scrap rail, random lgth	37.00 to 38.00
Rails, 18 in. and under	44.00 to 45.00
Angles and splice bars	36.00 to 37.00
No. 1 cupola cast.	44.00 to 45.00
Stove plate	44.00 to 45.00
Cast iron car wheels	33.00 to 34.00
Unstripped motor blocks	32.00 to 33.00

New York

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$26.00 to $27.00
No. 2 hvy. melting	19.00 to 20.00
No. 2 dealer bundles	14.00 to 15.00
Machine shop turnings	2.00 to 3.00
Mixed bor. and turn.	3.00 to 4.00
Shoveling turnings	5.00 to 6.00
Clean cast. chem. borings	17.00 to 18.00
No. 1 machinery cast.	36.00 to 37.00
Mixed yard cast.	32.00 to 33.00
Heavy breakable cast.	30.00 to 31.00
Stainless	
18-8 prepared solids	160.00 to 165.00
18-8 turnings	80.00 to 85.00
430 prepared solids	70.00 to 75.00
430 turnings	20.00 to 25.00

Detroit

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$19.00 to $20.00
No. 2 hvy. melting	16.00 to 17.00
No. 1 dealer bundles	23.00 to 24.00
No. 2 bundles	16.00 to 17.00
No. 1 busheling	19.00 to 20.00
Drop forge flashings	19.00 to 20.00
Machine shop turn.	6.00 to 7.00
Mixed bor. and turn.	9.00 to 10.00
Shoveling turnings	9.00 to 10.00
Cast iron borings	9.00 to 10.00
Heavy breakable cast.	24.00 to 25.00
Mixed cupola cast	30.00 to 31.00
Automotive cast.	34.00 to 35.00
Stainless	
18-8 bundles and solids	145.00 to 150.00
18-8 turnings	45.00 to 50.00
430 bundles and solids	50.00 to 55.00

Boston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$22.00 to $23.00
No. 2 hvy. melting	18.00 to 19.00
No. 1 dealer bundles	22.00 to 23.00
No. 2 bundles	12.00 to 13.00
No. 1 busheling	22.00 to 23.00
Machine shop turn.	3.50 to 4.50
Shoveling turnings	7.00 to 8.00
Clean cast. chem. borings	11.00 to 12.00
No. 1 machinery cast.	37.00 to 38.00
Mixed cupola cast.	29.00 to 30.00
Heavy breakable cast.	25.50 to 26.50

San Francisco

No. 1 hvy. melting	$32.00
No. 2 hvy. melting	29.00
No. 1 dealer bundles	$27.00 to 28.00
No. 2 bundles	18.00
Machine shop turn.	14.00
Cast iron borings	14.00
No. 1 cupola cast.	46.00 to 48.00

Los Angeles

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	26.00 to 27.00
No. 1 dealer bundles	24.00 to 25.00
No. 2 bundles	17.00
Machine shop turn.	12.00
Shoveling turnings	13.00
Cast iron borings	13.00
Elec. furnace 1 ft. and under (foundry)	42.00
No. 1 cupola cast.	37.00 to 38.00

Seattle

No. 1 hvy. melting	$33.00
No. 2 hvy. melting	31.00
No. 2 bundles	21.00
No. 1 cupola cast.	36.00
Mixed yard cast.	31.00

Hamilton, Ont

Brokers buying prices per net ton on cars:

No. 1 hvy. melting	$24.00
No. 2 hvy. melting cut 3 ft. and under	20.50
No. 1 dealer bundles	24.00
No. 2 bundles	17.00
Mixed steel scrap	16.00
Bush., new fact, prep'd	23.00
Bush., new fact, unprep'd	18.00
Machine shop turn.	8.00
Short steel turn.	12.00
Mixed bor. and turn.	12.00
Cast scrap	30.00

Houston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$32.00
No. 2 hvy. melting	29.00
No. 2 bundles	20.50
Machine shop turn.	8.00
Shoveling turnings	11.00
Cut structural plate 2 ft. & under	$40.00 to 41.00
Unstripped motor blocks	26.00 to 27.00
Cupola cast.	33.00 to 34.00
Heavy breakable cast.	25.00 to 26.00

Why Zinc Price Dropped Again

First drop in zinc price lasted only a week.

But, at the new price, domestic zinc is competitive with imports. But no great increase in buying is expected.

■ The first new price on prime western zinc in almost a year held only a week. Seven days later it dropped another 0.5¢ per lb.

The new price is 12¢ per lb at E. St. Louis, and 12.50¢ delivered in New York.

Why did the price drop again so soon?

Too Little? — "It should have dropped a full cent in the first place," says the sales manager of a major zinc company. There was too much difference between European and U. S. prices, he notes.

At London, zinc is about 10¢ per lb. Zinc men figure about 1½¢ per lb for shipping and duty. "As long as we are only 1¢ or so over Europe on the East Coast, we are all right," says this zinc sales chief.

As foreign zinc moves inland, the price increases, he notes. And domestic zinc prices are cheaper inland, closer to the source. So at the major consuming centers, U. S. and foreign metal are now competitive.

Sales Effect—The sales chief of another company points out that the lower zinc price is not likely to affect sales. "But while we are not going to sell any more, at the higher price the domestic industry might be prompted to produce more, and further contribute to the current surplus of supply over demand," he cautions.

This source suggests that if the European price holds, (and he thinks it will) and the European economy continues to boom, U. S. producers might even be able to export some metal to take the strain off the U. S. price.

Year-End Statement — Another zinc salesman estimates his company is going to wind up 1960 with business about 5 pct below 1959. This is likely to be very close to the average for the industry, possibly a little better.

Along with many in the industry, this spokesman doesn't see much chance for improvement before the second half of 1961. He sees the sagging steel market, particularly in galvanizing, as the key. When steel turns up, he believes, zinc will move with it.

Magnesium

Both production and shipments of magnesium in 1960 bettered 1959, reports Magnesium Assn. executive secretary Jerry Singleton.

But, more significant, Mr. Singleton points out that in 1960, shipments topped production, the third year in a row.

Several years ago, Dow Chemical Co., then the only major producer of magnesium in the U. S. closed down one of its plants. Why? Because production had exceeded shipments by so much the company had tremendous unsold stocks of metal. It now appears that, within a year or so, Dow will either put this smelter back on stream, or Alamet, the new producer at Selma, Ala., will increase its capacity to meet demand.

Primary output this year was 39,600 tons, up 28 pct over the 31,033 tons made last year. Shipments totalled 51,500 tons this year, topping production by 30 pct, and shipments last year by 8 pct.

Shipments of wrought magnesium and most forms of castings were off. But this was expected, he says.

He concludes: "This magnesium industry finds itself at a turning point. There is little expectation of a dramatic application to create a magnesium boom, but key people of the industry are more certain than ever before that its steady future growth is assured."

Scrap

Writing in the official Commodity Review and Outlook of the National Assn. of Secondary Material Industries, Robert S. Kahn, president of the metal dealers division, points out that purchase by Japanese and European buyers of large tonnages of nonferrous scrap in the U. S. kept the domestic market "from falling out of bed completely" in 1960.

Next year, Mr. Kahn looks for the boom abroad to show "no signs of diminishing." Further, he suggests that domestic mills and foundries "appear determined to price their products more competitively."

Primary Prices

(cents per lb)	current price	last price	date of change
Aluminum ingot	26.00	24.70	12/17/59
Copper (E)	30.00	33.00	10/11/60
Copper (CS)	30.00	31.00	10/13/60
Copper (L)	30.00	33.00	10/13/60
Lead, St. L.	10.80	11.80	12/13/60
Lead, N. Y.	11.00	12.00	12/13/60
Magnesium ingot	38.00	34.50	8/13/58
Magnesium pig	35.25	33.75	8/13/58
Nickel	74.00	64.50	12/8/58
Titanium sponge	158-180	162-182	8/1/59
Zinc, E. St. L.	12.50	13.00	12/13/60
Zinc, N. Y.	13.00	13.50	12/13/60

ALUMINUM: 99% ingot COPPER: (E) = electrolytic, (CS) = custom smelters, electrolytic. (L) = lake. LEAD: common grade. MAGNESIUM: 99.8% pig Velasco, Tex. NICKEL: Port Colborne, Canada. ZINC: prime western. Other primary prices, pg. 77.

NONFERROUS PRICES

MILL PRODUCTS

(Cents per lb unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. customer's plant)

Flat Sheet (Mill Finish and Plate)

("F" temper except 6061-0)

Alloy	.030-.038	.048-.061	.077-.096	.136-.250
1100, 3003	48.4	47.4	46.4	45.4
5052	55.8	53.0	50.8	49.2
6061-0	53.0	50.3	48.4	47.0

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
1-17	45.3-46.8	54.0-61.8
18-32	45.8-47.5	58.6-81.5
33-38	49.5-52.2	85.1-96.6
39-44	59.8-63.6	102.0-124.9

Screw Machine Stock—2011-T-3

Size"	7/32-5/16	11/32-23/32	3/4-1 1/16	1 3/32-1 3/4
Price	60.0	59.2	57.7	55.3

Roofing Sheet, Corrugated

(Per sheet, 26" wide base, 16,000 lb)

Length"→	72	96	120	144
.019 gage	$1.506	$2.013	$2.515	$3.017

MAGNESIUM

(F.o.b. shipping pt., carload frt. allowed)

Sheet and Plate

Type↓ Gage→	.250 3.00	.250-2.00	.188	.081	.032
AZ31B Stand. Grade	.....	67.9	69.0	77.9	103.1
AZ31B Spec.	.....	93.3	96.9	108.7	171.3
Tread Plate	.....	70.6	71.7	.....	.....
Tooling Plate	73.0	.....	.....	.....	.....

Extruded Shapes

factor→	6-8	12-14	24-26	36-38
Comm. Grade. (AZ31C)	65.3	65.3	66.1	71.5
Spec. Grade... (AZ31B)	84.6	85.7	90.6	104.2

Alloy Ingot

AZ91B (Die Casting)..... 37.25 (delivered)
AZ63A, AZ92A, AZ91C (Sand Casting) 40.75 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	138	120	138
Strip, CR	124	108	138
Rod, bar, HR	107	89	109
Angles, HR	107	89	109
Plates, HR	130	110	126
Seamless tube	157	129	200
Shot, blocks	...	87	...

COPPER, BRASS, BRONZE

(Freight included in 5000 lbs)

	Sheet	Wire	Rod	Tube
Copper	55.13	.....	52.36	56.22
Brass, Yellow	49.27	49.56	49.21	53.43
Brass, Low	51.75	52.04	51.69	55.81
Brass, Red	52.62	52.91	52.56	56.68
Brass, Naval	54.08	60.39	47.89	58.34
Munts Metal	52.14	.....	47.45	.....
Comm. Bz.	54.03	54.32	53.97	57.84
Mang. Bz.	57.82	.....	51.42	.....
Phos. Bz. 5%	75.70	75.70	76.20	77.63

Free Cutting Brass Rod..... 34.83

TITANIUM

(Base Prices f.o.b. mill)

Sheet and strip, commercially pure, $6.75-$13.00; alloy, $13.40-$17.00. Plate, HR, commercially pure, $5.25-$9.00; alloy, $8.00-$10.00. Wire, rolled and/or drawn, commercially pure, $5.55-$6.05; alloy, $5.55-$9.00; bar, HR or forged, commercially pure, $4.00-$4.50; alloy, $4.00-$6.25; billets, HR, commercially pure, $3.20-$3.70; alloy, $3.20-$4.75.

PRIMARY METAL

(Cents per lb unless otherwise noted)

Antimony, American, Laredo, Tex.. 29.50
Beryllium Aluminum 5% Be, Dollars per lb contained Be $65.00
Beryllium copper, per lb conta'd Be. $43.00
Beryllium 97% lump or beads, f.o.b. Cleveland, Reading $70.00
Bismuth, ton lots ..... $ 2.25
Cadmium, del'd ..... $ 1.50
Calcium, 99.9% small lots ..... $ 4.55
Chromium, 99.8% metallic base.... $ 1.31
Cobalt, 97-99% (per lb).... $1.50 to $ 1.57
Germanium, per gm, f.o.b. Miami, Okla., refined ..... $29.95 to $36.95
Gold, U. S. Treas., per troy oz..... $35.00
Indium, 99.9% dollars per troy oz.. $ 2.25
Iridium, dollars per troy oz..... $75 to $85
Lithium, 98% ..... $9.00 to $12.00
Magnesium sticks, 10,000 lb..... 57.00
Mercury, dollars per 76-lb flask f.o.b. New York ..... $208 to $210
Nickel oxide sinter at Buffalo, N. Y., or other U. S. points of entry, contained nickel 69.60
Palladium, dollars per troy oz...$24 to $26
Platinum, dollars per troy oz...$82 to $85
Rhodium ..... $137 to $140
Silver ingots (¢ per troy oz.)..... 91.375
Thorium, per kg $43.00
Vanadium ..... $ 3.65
Zirconium sponge ..... $ 5.00

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5 ingot
- No. 115 ..... 28.25
- No. 120 ..... 27.25
- No. 123 ..... 26.25

80-10-10 ingot
- No. 305 ..... 32.75
- No. 315 ..... 30.50

88-10-2 ingot
- No. 210 ..... 40.50
- No. 215 ..... 37.25
- No. 245 ..... 32.50

Yellow ingot
- No. 405 ..... 23.50

Manganese bronze
- No. 421 ..... 27.50

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys
- 0.30 copper max. 24.25-24.50
- 0.60 copper max. 24.00-24.25

Piston alloys (No. 132 type)..26.00-27.00
No. 12 alum. (No. 2 grade)...22.75-23.25
108 alloy 23.25-23.75
195 alloy 25.75-26.75
13 alloy (0.60 copper max.)...24.00-24.25
AXS-679 (1 pct zinc) 23.00-24.00

Steel deoxidizing aluminum notch bar granulated or shot
Grade 1—95-97½% 23.75-24.75
Grade 2—92-95% 22.50-23.50
Grade 3—90-92% 21.50-22.50
Grade 4—85-90% 21.00-22.00

SCRAP METAL

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	26	25¼
Yellow brass	20⅝	18⅝
Red brass	23¼	22½
Comm. bronze	24	23¼
Mang. bronze	19½	18⅝
Free cutting rod ends.	19⅝	

Customs Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire 24½
No. 2 copper wire 23¼
Light copper 21
*Refining brass 21¼
Copper bearing material 20¼
*Dry copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire 24¼
No. 2 copper wire 23
Light copper 21
No. 1 composition 19¾
No. 1 cop. turnings 20¼
Hvy. yellow brass solids 15½
Brass pipe 14½
Radiators 16½

Aluminum

Mixed old cast. ..... 12½—13
Mixed new clips ..... 14½—15
Mixed turnings, dry ..... 13 —14

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Copper and Brass

No. 1 copper wire ..... 22 —22¼
No. 2 copper wire ..... 20½—21
Light copper ..... 18½—19
Auto radiators (unsweated).. 12½—13
No. 1 composition ..... 17½—18
No. 1 composition turnings... 16 —17
Cocks and faucets ..... 13 —13½
Clean heavy yellow brass ... 12¼—12½
Brass pipe ..... 13½—14
New soft brass clippings..... 13½—14
No. 1 brass rod turnings .... 12½—13

Aluminum

Alum. pistons and struts .... 6½— 7
Aluminum crankcase ..... 8½— 9
1100 (8s) aluminum clippings 11½—12
Old sheet and utensils ..... 8½— 9
Borings and turnings ..... 4½— 5
Industrial castings ..... 9 — 9½
2020 (24s) clippings ..... 10 —10½

Zinc

New zinc clippings ..... 7 — 7¼
Old zinc ..... 4 — 4½
Zinc routings ..... 3 — 3¼
Old die cast scrap ..... 2 — 2¼

Nickel and Monel

Pure nickel clippings 52-54
Clean nickel turnings 40
Nickel anodes 52-54
Nickel rod ends 52-54
New Monel clippings 23-23.50
Clean Monel turnings 16.50-17
Old sheet Monel 22-23
Nickel silver clippings, mixed. 18
Nickel silver turnings, mixed. 15

Lead

Soft scrap lead ..... 7¾— 8
Battery plates (dry) ..... 3 — 3½
Batteries, acid free ..... 2 — 2¼

Miscellaneous

Block tin ..... 75 —77
No. 1 pewter ..... 57.50—58
Auto babbitt ..... 43 —44
Mixed common babbitt ..... 10¼—10¾
Solder joints ..... 14½—15
Siphon tops 41
Small foundry type ..... 9¾—10¼
Monotype ..... 9¾—10¼
Lino. and stereotype ..... 8¾— 9
Electrotype ..... 7½— 7¾
Hand picked type shells ..... 5¼— 5¾
Lino. and stereo. dross ..... 2¼— 2¾
Electro dross ..... 2¼— 2¾

(Effective Dec. 23, 1960)

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PIL-ING	SHAPES, STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	Bethlehem, Pa.			$119.00 *B3*		5.55 *B3*	8.10 *B3*	5.55 *B5*						
	Buffalo, N. Y.	$80.00 *R3, B3*	$99.50 *R3, B3*	$119.00 *R3, B3*	6.50 *B3*	5.55 *B3*	8.10 *B3*	5.55 *B3*	5.10 *B3,*	7.425 *S10, R7*	7.575 *B3*			
	Phila., Pa.									7.875 *P15*				
	Harrison, N. J.													15.55 *C11*
	Conshohocken, Pa.		$104.50 *A2*	$126.00 *A2*					5.15 *A2*		7.575 *A2*			
	New Bedford, Mass.									7.875 *R6*				
	Johnstown, Pa.	$80.00 *B3*	$99.50 *B3*	$119.00 *B3*		5.55 *B3*	8.10 *B3*							
	Boston, Mass.									7.975 *T8*				15.90 *T8*
	New Haven, Conn.									7.875 *D1*				
	Baltimore, Md.									7.425 *T8*				15.90 *T8*
	Phoenixville, Pa.					5.55 *P2*		5.55 *P2*						
	Sparrows Pt., Md.								5.10 *B3*		7.575 *B3*			
	New Britain, Wallingford, Conn.			$119.00 *N8*						7.875 *W1,S7*				
	Pawtucket, R. I. Worcester, Mass.									7.975 *N7, A5*				15.90 *N7* 15.70 *T8*
MIDDLE WEST	Alton, Ill.								5.30 *L1*					
	Ashland, Ky.								5.10 *A7*		7.575 *A7*			
	Canton-Massillon, Dover, Ohio		$102.00 *R3*	$119.00 *R3, T5*						7.425 *G4*		10.80 *G4*		
	Chicago, Franklin Park, Evanston, Ill.	$80.00 *U1, R3*	$99.50 *U1, R3,W8*	$119.00 *U1, R3,W8*	6.50 *U1*	5.50 *U1, W8,P13*	8.05 *U1, Y1,W8*	5.50 *U1*	5.10 *W8, N4,A1*	7.525 *A1,T8, M8* 7.525* *M8*	7.575 *W8*		8.40 *W8, S9,I3*	15.55 *A1, S9,G4,T8*
	Cleveland, Ohio									7.425 *A5,J3*		10.75 *A5*	8.40 *J3*	15.60 *N7*
	Detroit, Mich.			$119.00 *R5*					5.10 *G3, M2*	7.425 *M2, S1, D1, P11, B9*	7.575 *G3*	10.80 *S1*		
	Anderson, Ind.									7.425 *G4*				
	Gary, Ind. Harbor, Indiana	$80.00 *U1*	$99.50 *U1*	$119.00 *U1, Y1*		5.50 *U1, I3*	8.05 *U1, J3*	5.50 *I3*	5.10 *U1, I3,Y1*	7.425 *Y1*	7.575 *U1, I3,Y1*	10.90 *Y1*	8.40 *U1, Y1*	
	Sterling, Ill.	$80.00 *N4*				5.50 *N4*	7.75 *N4*	5.50 *N4*	5.20 *N4*					
	Indianapolis, Ind.									7.575 *R5*				15.70 *R5*
	Newport, Ky.								5.10 *A9*				8.40 *A9*	
	Niles, Warren, Ohio Sharon, Pa.		$99.50 *S1, C10*	$119.00 *C10,S1*					5.10 *R3, S1*	7.425 *R3, T4,S1*	7.575 *R3, S1*	10.80 *R3, S1*	8.40 *S1*	15.55 *S1*
	Owensboro, Ky.	$80.00 *G5*	$99.50 *G5*	$119.00 *G5*										
	Pittsburgh Midland Butler Aliquippa N. Castle McKeesport Pa.	$80.00 *U1, P6*	$99.50 *U1, C11,P6*	$119.00 *U1, C11,B7*	6.50 *U1*	5.50 *U1, J3*	8.05 *U1, J3*	5.50 *U1*	5.10 *P6*	7.425 *J3, B4, M10* 7.525 *E3*			8.40 *S9*	15.55 *S9* 15.60 *N7*
	Weirton, Wheeling, Follansbee, W. Va.				6.50 *U1, W3*	5.50 *W3*		5.50 *W3*	5.10 *W3*	7.425 *W5*	7.575 *W3*	10.80 *W3*		
	Youngstown, Ohio	$80.00 *R3*	$99.50 *Y1, C10*	$119.00 *Y1*			8.05 *Y1*		5.10 *U*	7.425 *Y1,R5*	7.575 *U1, Y1*	10.95 *Y1*	8.40 *U1, Y1*	15.55 *R5, Y1*
WEST	Fontana, Cal.	$90.50 *K1*	$109.00 *K1*	$140.00 *K1*		6.30 *K1*	8.85 *K1*	6.45 *K1*	5.825 *K1*	9.20 *K1*				
	Geneva, Utah		$99.50 *C7*			5.50 *C7*	8.05 *C7*							
	Kansas City, Mo.					5.60 *S2*	8.15 *S2*						8.65 *S2*	
	Los Angeles, Torrance, Cal.		$109.00 *B2*	$139.00 *B2*		6.20 *C7, B2*	8.75 *B2*		5.85 *C7, B2*	9.30 *C1,R5*			9.60 *B2*	17.75 *J3*
	Minnequa, Colo.					5.80 *C6*			6.20 *C6*	9.375 *C6*				
	Portland, Ore.					6.25 *O2*								
	San Francisco, Niles, Pittsburg, Cal.		$109.00 *B2*			6.15 *B2*	8.70 *B2*		5.85 *C7, B2*					
	Seattle, Wash.		$109.00 *B2*	$140.00 *B2*		6.25 *B2*	8.80 *B2*		6.10 *B2*					
SOUTH	Atlanta, Ga.					5.70 *A8*			5.10 *A8*					
	Fairfield, City, Ala. Birmingham, Ala.	$80.00 *T2*	$99.50 *T2*			5.50 *T2 R3,C16*	8.05 *T2*		5.10 *T2, R3,C16*		7.575 *T2*			
	Houston, Lone Star, Texas		$104.50 *S2*	$124.00 *S2*		5.60 *S2*	8.15 *S2*						8.65 *S2*	

* Electro-galvanized-plus galvanizing extras:

(Effective Dec. 23, 1960)

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		SHEETS								WIRE ROD	TINPLATE†		
		Hot-rolled *18* ga. & hvyr.	Cold-rolled	Galvanized (Hot-dipped)	Enameling	Long Terne	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.		Cokes* *1.25*-lb. base box	Electro** *0.25*-lb. base box	Thin *0.25* lb. coating in coils
EAST	Buffalo, N. Y.	5.10 *B3*	6.275 *B3*				7.525 *B3*	9.275 *B3*		6.40 *W6*	† Special coated mfg. terne deduct 35¢ from 1.25-lb. coke base box price 0.75 lb./0.25 lb. add 55¢. Can-making quality BLACKPLATE 55 to 128 lb. deduct $2.20 from 1.25 lb. coke base box. * COKES: 1.50-lb. add 25¢. **ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add $1.00. Differential 1.00 lb./0.25 lb. add 65¢.		Prices are for .50 lb. base box for .45 lb. deduct 15¢; for .55 lb. add 15¢; for .60 lb. add 30¢.
	Claymont, Del.												
	Coatesville, Pa.												
	Conshohocken, Pa.	5.15 *A2*	6.325 *A2*				7.575 *A2*						
	Harrisburg, Pa.												
	Hartford, Conn.												
	Johnstown, Pa.									6.40 *B3*			
	Fairless, Pa.	5.15 *U1*	6.325 *U1*				7.575 *U1*	9.325 *U1*			$10.50 *U1*	$9.20 *U1*	$6.35 *U1*
	New Haven, Conn.												
	Phoenixville, Pa.												
	Sparrows Pt., Md.	5.10 *B3*	6.275 *B3*	6.875 *B3*	6.775 *B3*		7.525 *B3*	9.275 *B3*	10.025 *B3*	6.50 *B3*	$10.40 *B3*	$9.10 *B3*	6.25 *B3*
	Worcester, Mass.									6.70 *A5*			
MIDDLE WEST	Alton, Ill.									6.60 *L1*			
	Ashland, Ky.	5.10 *A7*		6.875 *A7*	6.775 *A7*		7.525 *A7*						
	Canton-Massillon, Dover, Ohio			6.875 *R1, R3*									
	Chicago, Joliet, Ill.	5.10 *W8, A1*					7.525 *U1, W8*			6.40 *A5, R3, W8*			
	Sterling, Ill.									6.50 *N4, K2*			
	Cleveland, Ohio	5.10 *R3, J3*	6.275 *R3, J3*	7.65 *R3**	6.775 *R3*		7.525 *R3, J3*	9.275 *R3, J3*		6.40 *A5*			
	Detroit, Mich.	5.10 *G3, M2*	6.275 *G3, M2*				7.525 *G3*	9.275 *G3*					
	Newport, Ky.	5.10 *A9*	6.275 *A9*										
	Gary, Ind. Harbor, Indiana	5.10 *U1, I3, Y1*	6.275 *U1, I3, Y1*	6.875 *U1, I3*	6.775 *U1, I3, Y1*	7.225 *U1*	7.525 *U1, Y1, I3*	9.275 *U1, Y1*		6.40 *Y1*	$10.40 *U1, Y1*	$9.10 *I3, U1, Y1*	$6.25 *U1*
	Granite City, Ill.	5.20 *G2*	6.375 *G2*	6.975 *G2*								$9.20 *G2*	
	Kokomo, Ind.			6.975 *C9*						6.50 *C9*			
	Mansfield, Ohio	5.10 *E2*	6.275 *E2*			7.225 *E2*							
	Middletown, Ohio		6.275 *A7*	6.875 *A7*	6.775 *A7*	7.225 *A7*							
	Niles, Warren, Ohio Sharon, Pa.	5.10 *R3, SI*	6.275 *R3*	6.875 *R3* 7.65 *R3**	6.775 *SI*	7.225 *SI*†† *R3*	7.525 *R3, SI*	9.275 *R3*				$9.10 *R3*	
	Pittsburgh, Midland, Butler, Aliquippa, McKeesport Pa.	5.10 *U1, J3, P6*	6.275 *U1, J3, P6*	6.875 *U1, J3* 7.50 *E3**	6.775 *U1*		7.525 *U1, J3*	9.275 *U1, J3*	10.025 *U1, J3*	6.40 *A5, J3, P6*	$10.40 *U1, J3*	$9.10 *U1, J3*	$6.25 *U1*
	Portsmouth, Ohio	5.10 *P7*	6.275 *P7*							6.40 *P7*			
	Weirton, Wheeling, Follansbee, W. Va.	5.10 *W3, W5*	6.275 *W3, F3, W5*	6.875 *W3, W5* 7.50 *W3**		7.225 *W3, W5*	7.525 *W3*	9.275 *W3*			$10.40 *W5, W3*	$9.10 *W5, W3*	
	Youngstown, Ohio	5.10 *U1, Y1*	6.275 *Y1*		6.775 *Y1*		7.525 *Y1*	9.275 *Y1*		6.40 *Y1*			
WEST	Fontana, Cal.	5.825 *K1*	7.40 *K1*				8.25 *K1*	10.40 *K1*			$11.05 *K1*	$9.75 *K1*	
	Geneva, Utah	5.20 *C7*											
	Kansas City, Mo.									6.65 *S2*			
	Los Angeles, Torrance, Cal.									7.20 *B2*			
	Minnequa, Colo.									6.65 *C6*			
	San Francisco, Niles, Pittsburg, Cal.	5.80 *C7*	7.225 *C7*	7.625 *C7*						7.20 *C7*	$11.05 *C7*	$9.75 *C7*	
SOUTH	Atlanta, Ga.												
	Fairfield, Ala. Alabama City, Ala.	5.10 *T2, R3*	6.275 *T2, R3*	6.875 *T2, R3*	6.775 *T2*					6.40 *T2, R3*	$10.50 *T2*	$9.20 *T2*	$6.35 *T2*
	Houston, Texas									6.65 *S2*			

Hollowware Enameling
29 ga.—7.85 *U1* at Gary; Pittsburgh; *J3* at Aliquippa; *W5* at Yorkville; *Y1* at Indiana Harbor; *W5* at Wheeling; 7.95 *G2* at Granite City.

* Electrogalvanized sheets.

(Effective Dec. 23, 1960)

†† 7.425 at Sharon; Niles is 7.225.

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BARS						PLATES				WIRE
		Carbon† Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr's. Bright
EAST	Bethlehem, Pa.				6.725 *B3*	9.025 *B3*	8.30 *B3*					
	Buffalo, N. Y.	5.675 *R3,B3*	5.675 *R3,B3*	7.70 *B5*	6.725 *B3,R3*	9.025 *B3,B5*	8.30 *B3*	5.30 *B3*				8.00 *W6*
	Claymont, Del.							5.30 *P2*		7.50 *P2*	7.95 *P2*	
	Coatesville, Pa.							5.30 *L4*		7.50 *L4*	7.95 *L4*	
	Conshohocken, Pa.							5.30 *A2*	6.375 *A2*	7.50 *A2*	7.95 *A2*	
	Harrisburg, Pa.							5.30 *P2*	6.375 *P2*			
	Milton, Pa.	5.825 *M7*	5.825 *M7*									
	Hartford, Conn.			8.15 *R3*		9.325 *R3*						
	Johnstown, Pa.	5.675 *B3*	5.675 *B3*		6.725 *B3*		8.30 *B3*	5.30 *B3*		7.50 *B3*	7.95 *B3*	8.00 *B3*
	Steelton, Pa.		5.675 *B3*									
	Fairless, Pa.	5.825 *U1*	5.825 *U1*									
	Newark, Camden, N. J.			8.10 *W10, P10*		9.20 *W10, P10*						
	Bridgeport, Putnam, Willimantic, Conn.			8.20 *W10* 8.15 *J3*	6.80 *N8*	9.175 *N8*						
	Sparrows Pt., Md.		5.675 *B3*					5.30 *B3*		7.50 *B3*	7.95 *B3*	8.10 *B3*
	Palmer, Worcester, Readville, Mansfield, Mass.			8.20 *B5, C14*		9.325 *A5,B5*						8.30 *A5, W6*
	Spring City, Pa.			8.10 *K4*		9.20 *K4*						
MIDDLE WEST	Alton, Ill.	5.875 *L1*										8.20 *L1*
	Ashland, Newport, Ky.							5.30 *A7, A9*		7.50 *A9*	7.95 *A7*	
	Canton, Massillon, Mansfield, Ohio	6.15* *R3*		7.65 *R3,R2*	6.725 *R3, T5*	9.025 *R3,R2, T5*		5.30 *E2*				
	Chicago, Joliet, Waukegan, Madison, Harvey, Ill.	5.675 *U1,R3, W8,N4,P13*	5.675 *U1,R3, N4,P13,W8* 5.875 *L1*	7.65 *A5, W10,W8, B5,L2,N9*	6.725 *U1,R3, W8*	9.025 *A5, W10,W8, L2,N8,B5*	8.30 *U1,W8, R3*	5.30 *U1,A1, W8,I3*	6.375 *U1*	7.50 *U1, W8*	7.95 *U1, W8*	8.00 *A5,R3, W8,N4, K2,W7*
	Cleveland, Elyria, Ohio	5.675 *R3*	5.675 *R3*	7.65 *A5,C13, C18*		9.025 *A5, C13,C18*	8.30 *R3*	5.30 *R3,J3*	6.375 *J3*		7.95 *R3,J3*	8.00 *A5, C13,C18*
	Detroit, Plymouth, Mich.	5.675 *G3*	5.675 *G3*	7.90 *P3* 7.85 *P8B5H2* 7.65 *R5*	6.725 *R5,G3*	9.025 *R5,P8* 9.225 *B5,P3*	8.30 *G3*	5.30 *G3*		7.50 *G3*	7.95 *G3*	
	Duluth, Minn.											8.00 *A5*
	Gary, Ind. Harbor, Crawfordsville, Hammond, Ind.	5.675 *U1,I3, Y1*	5.675 *U1,I3, Y1*	7.65 *R3,J3*	6.725 *U1,I3, Y1*	9.025 *R3,M4*	8.30 *U1,Y1*	5.30 *U1,I3, Y1*	6.375 *J3, I1*	7.50 *U1, Y1*	7.95 *U1, Y1,I3*	8.10 *M4*
	Granite City, Ill.							5.40 *G2*				
	Kokomo, Ind.		5.775 *C9*									8.10 *C9*
	Sterling, Ill.	5.775 *N4*	5.775 *N4*				7.925 *N4*	5.30 *N4*			7.625 *N4*	8.10 *K2*
	Niles, Warren, Ohio Sharon, Pa.			7.65 *C10*	6.725 *C10,*	9.025 *C10*		5.30 *R3,S1*		7.50 *S1*	7.95 *R3, S1*	
	Owensboro, Ky.	5.675 *G5*			6.725 *G5*							
	Pittsburgh, Midland, Donora, Aliquippa, Pa.	5.675 *U1,J3*	5.675 *U1,J3*	7.65 *A5,B4, R3,J3,C11, W10,S9,C8, M9*	6.725 *U1,J3, C11,B7*	9.025 *A5, W10,R3,S9, C11,C8,M9*	8.30 *U1,J3*	5.30 *U1,J3*	6.375 *U1,J3*	7.50 *U1, J3,B7*	7.95 *U1, J3,B7*	8.00 *A5, J3,P6*
	Portsmouth, Ohio											8.00 *P7*
	Youngstown, Steubenville, O.	5.675 *U1,R3, Y1*	5.675 *U1,R3, Y1*	7.65 *A1,Y1, F2*	6.725 *U1,Y1*	9.025 *Y1,F2*	8.30 *U1,Y1*	5.30 *U1,W5, R3,Y1*		7.50 *Y1*	7.95 *U1,Y1*	8.00 *Y1*
WEST	Emeryville, Fontana, Cal.	6.425 *J5* 6.375 *K1*	6.425 *J5* 6.375 *K1*		7.775 *K1*		9.00 *K1*	6.10 *K1*		8.30 *K1*	8.75 *K1*	
	Geneva, Utah							5.30 *C7*			7.95 *C7*	
	Kansas City, Mo.	5.925 *S2*	5.675 *S2*		6.975 *S2*		8.55 *S2*					8.25 *S2*
	Los Angeles, Torrance, Cal.	6.375 *C7,B2*	6.375 *C7,B2*	9.10 *R3,P14, S12*	7.775 *B2*	11.00 *P14, B5*	9.00 *B2*					8.95 *B2*
	Minnequa, Colo.	6.125 *C6*	6.125 *C6*					6.15 *C6*				8.25 *C6*
	Portland, Ore.	6.425 *O2*	6.425 *O2*									
	San Francisco, Niles, Pittsburg, Cal.	6.375 *C7* 6.425 *B2*	6.375 *C7* 6.425 *B2*				9.05 *B2*					8.95 *C7,C6*
	Seattle, Wash.	6.425 *B2,N6, A10*	6.425 *B2,A10*		7.825 *B2*		9.05 *B2*	6.20 *B2*		8.40 *B2*	8.85 *B2*	
SOUTH	Atlanta, Ga.	5.875 *A8*	5.25 *A8*									8.00 *A8*
	Fairfield City, Ala. Birmingham, Ala.	5.675 *T2,R3, C16*	5.675 *T2,R3, C16*	8.25 *C16*			8.30 *T2*	5.30 *T2,R3*			7.95 *T2*	8.00 *T2,R3*
	Houston, Ft. Worth, Lone Star, Texas, Sand Springs, Okla.	5.925 *S2*	5.675 *S2*		6.975 *S2*		8.55 *S2*	5.40 *S2*		7.60 *S2*	8.05 *S2*	8.25 *S2*

† Merchant Quality—Special Quality 35¢ higher. (Effective Dec. 23, 1960) * Special Quality.

STEEL PRICES

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angel Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, Ohio
A8 Atlantic Steel Co., Atlanta, Ga.
A9 Acme-Newport Steel Co., Newport, Ky.
A10 Alaska Steel Mills, Inc., Seattle, Wash.

B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Steel Co., Pacific Coast Div.
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.
B6 Brooke Plant, Wickwire-Spencer Steel Div., Birdsboro, Pa.
B7 A. M. Byers, Pittsburgh
B8 Braeburn Alloy Steel Corp., Braeburn, Pa.
B9 Barry Universal Corp., Detroit, Mich.

C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia Geneva Steel Div., San Francisco
C8 Columbia Steel & Shafting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Pittsburgh, Pa.
C11 Crucible Steel Co. of America, Pittsburgh
C13 Cuyahoga Steel & Wire Co., Cleveland
C14 Compressed Steel Shafting Co., Readville, Mass.
C15 G. O. Carlson, Inc., Thorndale, Pa.
C16 Connors Steel Div., Birmingham
C18 Cold Drawn Steel Plant, Western Automatic Machine Screw Co., Elyria, O.

D1 Detroit Steel Corp., Detroit
D2 Driver, Wilbur B., Co., Newark, N. J.
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.

E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire-Reeves Steel Corp., Mansfield, O.
E3 Enamel Products & Plating Co., McKeesport, Pa.

F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzsimons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.

G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit
G4 Greer Steel Co., Dover, O.
G5 Green River Steel Corp., Owensboro, Ky.

H1 Hanna Furnace Corp., Detroit
H2 Hercules Drawn Steel Corp., Toledo, O.

I2 Ingersoll Steel Div., New Castle, Ind.
I3 Inland Steel Co., Chicago, Ill.
I4 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.

K1 Kaiser Steel Corp., Fontana, Calif.
K2 Keystone Steel & Wire Co., Peoria
K4 Keystone Drawn Steel Co., Spring City, Pa.

L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.

M1 Mahoning Valley Steel Co., Niles, O.
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid States Steel & Wire Co., Crawfordsville, Ind.
M7 Milton Steel Products Div., Milton, Pa.
M8 Mill Strip Products Co., Evanston, Ill.
M9 Moltrup Steel Products Co., Beaver Falls, Pa.
M10 Mill Strip Products Co., of Pa., New Castle, Pa.

N1 National Supply Co., Pittsburgh
N2 National Tube Div., Pittsburgh
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.
N8 Carpenter Steel of New England, Inc., Bridgeport, Conn.
N9 Nelson Steel & Wire Co.

O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland

P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Steel Corp., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit
P9 Pacific States Steel Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden, N. J.
P11 Production Steel Strip Corp., Detroit
P13 Phoenix Mfg. Co., Joliet, Ill.
P14 Pacific Tube Co.
P15 Philadelphia Steel and Wire Corp.

R1 Reeves Steel & Mfg. Div., Dover, O.
R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebling Sons Co., John A., Trenton, N. J.
R5 Jones & Laughlin Steel Corp., Stainless and Strip Div.
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Steel Co., Rome, N. Y.

S1 Sharon Steel Corp., Sharon, Pa.
S2 Sheffield Steel Div., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw and Steel Co., Fitchburg, Mass.
S5 Sweet's Steel Co., Williamsport, Pa.
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Div. of Copperweld Steel Co.
S10 Seneca Steel Service, Buffalo
S11 Southern Electric Steel Co., Birmingham
S12 Sierra Drawn Div., Bliss & Laughlin, Inc., Los Angeles, Calif.
S13 Seymour Mfg. Co., Seymour, Conn.
S14 Screw and Bolt Corp. of America, Pittsburgh, Pa.

T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T7 Texas Steel Co., Fort Worth
T8 Thompson Wire Co., Boston

U1 United States Steel Corp., Pittsburgh
U2 Universal Cyclops Steel Corp., Bridgeville, Pa.
U3 Ulbrich Stainless Steels, Wallingford, Conn.
U4 U. S. Pipe & Foundry Co., Birmingham

W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago.
W8 Wisconsin Steel Div., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh
W12 Wallace Barnes Steel Div., Bristol, Conn.

Y1 Youngstown Sheet & Tube Co., Youngstown, O.

STEEL SERVICE CENTER PRICES

Metropolitan Price, dollars per 100 lb.

Cities	City Delivery‡ Charge	Sheets			Strip	Plates	Shapes	Bars		Alloy Bars			
		Hot-Rolled (18 ga. & hvr.)	Cold-Rolled (15 gage)	Galvanized (10 gage)††	Hot-Rolled		Standard Structurals	Hot-Rolled (merchant)	Cold-Finished	Hot-Rolled 4615 As rolled	Hot-Rolled 4140 Annealed	Cold-Drawn 4615 As rolled	Cold-Drawn 4140 Annealed
Atlanta		9.37	10.61	11.83	10.85	9.73	9.94	9.53	13.24	.....	.....	.....	.....
Baltimore**	.10	7.87	9.71	10.16	10.28	8.44	9.13	8.65	11.80	17.48	16.48	21.58	20.83
Birmingham**		8.46	10.20	10.69	9.45	8.41	8.47	8.26	13.14	16.76	16.76	.....	.....
Boston**	.10	9.84	10.68	11.87	12.26	9.72	10.26	9.87	13.45	17.79	16.79	23.89	21.14
Buffalo**	.15	8.80	9.95	11.40	11.15	8.80	9.30	8.90	11.60	17.45	16.45	21.55	20.80
Chicago**	.15	8.72	10.35	10.30	10.89	8.56	9.06	8.70	10.80	17.10	16.10	21.20	20.45
Cincinnati**	.15	8.89	10.41	10.35	11.21	8.94	9.62	9.02	11.68	17.42	16.42	21.52	20.77
Cleveland**	.15	8.72[1]	10.13	11.39	11.01	8.80	9.45	8.81	11.40	17.21	16.21	21.31	20.56
Denver**		10.90	12.53	13.27	13.07	10.74	11.24	10.88	12.97	.....	.....	.....	20.84
Detroit**	.15	8.98	10.61	10.65	11.26	8.93	9.62	9.01	11.16	17.38	16.38	21.48	20.73
Houston**		9.22	9.65	12.19[3]	10.78	8.95	8.86	8.63	13.10	17.50	16.55	21.55	20.85
Kansas City**	.15	9.59	11.42	10.95	11.76	9.43	9.93	9.57	11.77	17.17	15.87	21.87	21.12
Los Angeles**		9.50[1]	11.20	12.20	11.29	9.70	10.45	9.55	14.20	18.30	17.35	22.90	22.20
Memphis**	.15	9.13	10.50	.....	10.79	8.81	9.16	8.97	12.89	.....	.....	.....	.....
Milwaukee**	.15	8.86	10.49	10.44	11.03	8.70	9.28	8.84	11.04	17.24	16.24	21.24	20.59
New York	.10	9.46	10.23	11.45	11.56	9.61	10.30	9.84	13.35	17.50	16.50	21.60	20.85
Norfolk	.20	8.20	.....	.....	8.90	8.65	9.20	8.90	10.70	.....	.....	.....	.....
Philadelphia**	.10	8.45	9.70	10.76	10.45	8.80	9.05	8.85	12.05	17.48	16.48	21.58	20.83
Pittsburgh**	.15	8.72	10.13	11.28	10.99	8.56	9.06	8.70	11.40	17.10	16.10	21.20	20.45
Portland**		9.45	11.30	12.35	11.45	9.60	10.05	9.45	16.65	18.60	17.80	22.70	22.20
San Francisco**	.10	10.27	11.79[2]	11.50	11.88	10.48	10.50	10.17	15.20	18.30	17.35	22.90	22.20
Seattle**		10.51	11.57	12.50	11.95	10.10	10.65	9.94	16.20	18.60	17.80	22.70	22.20
Spokane**	.15	10.51	11.57	12.50	11.95	10.10	10.65	9.94	16.35	17.75	17.95	21.58	22.35
St. Louis**	.15	8.92	10.73	10.68	11.09	8.77	9.29	8.92	11.43	17.48	16.48	21.58	20.83
St. Paul**	.15	8.99	9.84	10.99	11.16	8.83	9.33	8.97	11.64	.....	16.69	.....	21.04

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 4999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may be combined with each other for quantity. ** These cities are on net pricing. Prices shown are for 2000 lb item quantities of the following: Hot-rolled sheet—10 ga. x 36 x 96—120; Cold-rolled sheet—20 ga x 36 x 96—120; Galv. sheet—10 ga x 36—120; Hot-rolled strip—¼" x 1"; Plate—¼" x 84"; Shapes—I-Beams 6 x 12.5; Hot-rolled bar—Rounds—⅝-2 15/16"; Cold-finished bar—C 1018—1" rounds; Alloy bar—hot-rolled 4615—1⅛" to 2⅞"; cold drawn—15/16" to 2⅞" round; Hot-rolled 4140—⅝" to 2⅞" round, cold drawn—15/16" to 2⅞" round.

†† 13c zinc. ‡ Deduct for country delivery. [1] 15 ga. & heavier; [2] 14 ga. & lighter. [3] 10 ga. x 48 — 120.

(Effective Dec 23, 1960)

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Birdsboro, Pa. *B6*	68.00	68.50	69.00	69.50	73.00
Birmingham *R3*	62.00	62.50*	66.50	.....	.....
Birmingham *W9*	62.00	62.50*	66.50	.....	.....
Birmingham *U4*	62.00	62.50*	66.50	.....	.....
Buffalo *R3*	66.00	66.50	67.00	67.50	.....
Buffalo *H1*	66.00	66.50	67.00	67.50	71.50†
Buffalo *W6*	66.00	66.50	67.00	67.50	.....
Chester *P2*	68.00	68.50	69.00	.....	.....
Chicago *I4*	66.00	66.50	66.50	67.00	.....
Cleveland *A5*	66.00	66.50	66.50	67.00	71.00†
Cleveland *R3*	66.00	66.50	66.50	67.00	.....
Duluth *I4*	66.00	66.50	66.50	67.00	71.00†
Erie *I4*	66.00	66.50	66.50	67.00	71.00†
Fontana *K1*	75.00	75.50	.....	.....	.....
Geneva, Utah *C7*	66.00	66.50	.....	.....	.....
Granite City *G2*	67.90	68.40	68.90	.....	.....
Hubbard *Y1*	.....	.....	66.50	.....	.....
Ironton, Utah *C7*	66.00	66.50	.....	.....	.....
Lyles, Tenn. *T3*	.....	.....	.....	.....	73.00
Midland *C11*	66.00	.....	.....	.....	.....
Minnequa *C6*	68.00	68.50	69.00	.....	.....
Monessen *P6*	66.00	.....	.....	.....	.....
Neville Is. *P4*	66.00	66.50	66.50	67.00	71.00†
N. Tonawanda *T1*	.....	66.50	67.00	67.50	.....
Rockwood *T3*	62.00	62.50	66.50	67.00	73.00
Sharpsville *S3*	66.00	.....	66.50	67.00	.....
So. Chicago *R3*	66.00	66.50	66.50	67.00	.....
So. Chicago *W8*	66.00	.....	66.50	67.00	.....
Swedeland *A2*	68.00	68.50	69.00	69.50	73.00†
Toledo *I4*	66.00	66.50	66.50	67.00	.....
Troy, N. Y. *R3*	68.00	68.50	69.00	69.50	73.00
Youngstown *Y1*	.....	.....	66.50	.....	.....

DIFFERENTIALS: Add, 75¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.25 pct manganese or portion thereof over 1 pct, $2 per ton for 0.50 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel.

Add $1.00 for 0.31–0.69 pct phos. Add 50¢ per gross ton for truck loading charge.

Silvery Iron: Buffalo (6 pct), *H1*, $79.25; Jackson *J1, I4*, (Globe Div.), $78.00; Niagara Falls (15.01–15.50), $101.00; Keokuk (14.01–14.50), $89.00; (15.51–16.00), $92.00. Add 75¢ per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 13 pct. Add $1.00 for each 0.50 pct manganese over 1.00 pct.

† Intermediate low phos.

FASTENERS

(Base discounts, f.o.b. mill, based on latest list prices)

Hex Screws and All Bolts Including Hex & Hex, Square Machine, Carriage, Lag, Plow, Step, and Elevator

(Discount for 1 container) — Pct

Plain finish—packaged and bulk.	50
Hot galvanized and zinc plated—packaged	43.75
Hot galvanized and zinc plated—bulk	50

Nuts: Hexagon and Square, Hex, Heavy Hex, Thick Hex & Square

(Discount for 1 container) — Pct

Plain finish—packaged and bulk.	50
Hot galvanized and zinc plated—packaged	43.75
Hot galvanized and zinc plated—bulk	50

Hexagon Head Cap Screws—UNC or UNF Thread—Bright & High Carbon

(Discount for 1 container)

Plain finish—packaged and bulk.	50
Hot galvanized and zinc plated—packaged	43.75
Hot galvanized and zinc plated—bulk	50

(On all the above categories add 25 pct for less than container quantities. Minimum plating charge—$10.00 per item. Add 7½ pct for nuts assembled to bolts)

Machine Screws and Stove Bolts

(Packages—plain finish)

	Discount Screws	Bolts
Full Cartons	46	46

Machine Screws—bulk

¼ in. diam or smaller	25,000 pcs	50
5/16, ⅜ & ½ in. diam	15,000 pcs	50

Machine Screw and Stove Bolt Nuts

(Packages—plain finish)

	Discount Hex	Square
Full Cartons	46	57
Bulk		
¼ in. diam or smaller	25,000 pcs	
5/16 or ⅜ in. diam	56	60
	15,000 pcs	
	56	60

Rivets

	Base per 100 *lb*
½ in. diam and larger	$12.85
	Pct Off List
7/16 in. and smaller	15

TOOL STEEL

F.o.b. mills

W	Cr	V	Mo	Co	per lb	SAE
18	4	1	—	—	$1.84	T-1
18	4	1	—	5	2.545	T-4
18	4	2	—	—	2.005	T-2
1.5	4	1.5	8	—	1.20	M-1
6	4	3	6	—	1.59	M-3
6	4	2	5	—	1.345	M-2
High-carbon chromium					.955	D-3, D-5
Oil hardened manganese					.505	O-2
Special carbon					.38	W-1
Extra carbon					.38	W-1
Regular carbon					.325	W-1

Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

LAKE SUPERIOR ORES

51.50% Fe natural, delivered lower Lake ports. Interim prices for 1960 season. Freight changes for seller's account.

	Gross Ton
Openhearth lump	$12.70
Old range, bessemer	11.85
Old range, nonbessemer	11.70
Mesabi, bessemer	11.60
Mesabi, nonbessemer	11.45
High phosphorus	11.45

(Effective Dec. 23, 1960)

STAINLESS STEEL

Base price cents per lb. f.o.b. mill

Product	201	202	301	302	303	304	316	321	347	403	410	416	430
Ingots, reroll.	22.75	24.75	24.00	26.25	—	28.00	41.25	33.50	38.50	—	17.50	—	17.75
Slabs, billets	25.00	28.25	26.00	29.50–32.75	32.00	29.50–34.50	47.50	38.00	46.50	—	19.25–21.50	—	19.75–21.75
Billets, forging	—	37.75	38.75	39.50	42.50	39.50	64.50	48.75	57.75	29.25	29.25	29.75	29.75
Bars, struct.	43.50	44.50	46.00	46.75	49.75	46.75	75.75	57.50	67.25	35.00	35.00	35.50	35.50
Plates	39.25	40.00	41.25	42.25	45.00	45.75	71.75	54.75	64.75	30.00	30.00	31.25–31.75	31.00
Sheets	48.50	49.25	51.25	52.00	56.75	52.00	80.75	65.50	79.25	40.25	40.25	48.25	40.75
Strip, hot-rolled	36.00	39.00	37.25	40.50	—	40.50	68.50	53.50	63.50	—	31.00	—	32.00
Strip, cold-rolled	45.00	49.25	47.50	52.00	56.75	52.00	80.75	65.50	79.25	40.25	40.25	42.50	40.75
Wire CF; Rod HR	—	42.25	43.50	44.25	47.25	44.25	71.75	54.50	63.75	33.25	33.25	33.75	33.75

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11;* Brackenridge, Pa., *A3;* Butler, Pa., *A7;* Vandergrift, Pa., *U1;* Washington, Pa., *W2, J2;* Baltimore, *E1;* Middletown, O., *A7;* Massillon, O., *R3;* Gary, *U1;* Bridgeville, Pa., *U2;* New Castle, Ind., *I2;* Detroit, *M2;* Louisville, O., *R5.*

Strip: Midland, Pa., *C11;* Waukegan, Cleveland, *A5;* Carnegie, Pa., *S9;* McKeesport, Pa., *F1;* Reading, Pa., *C2;* Washington, Pa., *W2;* W. Leechburg, Pa., *A3;* Bridgeville Pa., *U2;* Detroit, *M2;* Detroit, *S1;* Canton, Massillon, O., *R3;* Harrison, N. J., *D3;* Youngstown, *R5;* Sharon, Pa., *S1;* Butler, Pa., *A7;* Wallingford, Conn., *U3* (plus further conversion extras); *W1* (25¢ per lb. higher); Seymour, Conn., *S13,* (25¢ per lb. higher); New Bedford, Mass., *R6* Gary, *U1,* (25¢ per lb. higher); Baltimore, Md., *E1* (300 series only).

Bar: Baltimore, *A7;* S. Duquesne, Pa., *U1;* Munhall, Pa., *U1;* Reading, Pa., *C2;* Titusville, Pa., *U2;* Washington, Pa., *J2;* McKeesport, Pa., *U1, F1;* Bridgeville, Pa., *U2;* Dunkirk, N. Y., *A3;* Massillon, O., *R5;* S. Chicago, *U1;* Syracuse, N. Y., *C11;* Watervliet, N. Y., *A3;* Waukegan, *A5;* Canton, O., *T5, R3;* Ft. Wayne, *I4;* Detroit, *R5;* Gary, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Ambridge, Pa., *B7.*

Wire: Waukegan, *A5;* Massillon, O., *R3;* McKeesport, Pa., *F1;* Ft. Wayne, *J4;* Newark, N. J. *D2;* Harrison, N. J., *D3;* Baltimore, *A7;* Dunkirk, *A3;* Monessen, *P1;* Syracuse, *C11;* Bridgeville, *U2;* Detroit, *R5;* Reading, Pa., *C2;* Bridgeport, Conn., *N8* (down to and including ¼").

Structurals: Baltimore, *A7;* Massillon, O., *R3;* Chicago, Ill., *J4;* Watervliet, N. Y., *A3;* Syracuse, *C11;* S. Chicago, *U1.*

Plates: Ambridge, Pa., *B7;* Baltimore, *E1;* Brackenridge, Pa., *A3;* Chicago, *U1;* Munhall, Pa., *U1;* Midland, Pa., *C11;* New Castle, Ind., *I2;* Middletown, *A7;* Washington, Pa., *J2;* Cleveland, Massillon, *R3;* Coatesville, Pa., *C15;* Vandergrift, Pa., *U1;* Gary, *U1.*

Forging billets: Ambridge, Pa., *B7;* Midland, Pa., *C11;* Baltimore, *A7;* Washington, Pa., *J2;* McKeesport, *F1;* Massillon, Canton, O., *R3;* Watervliet, *A3;* Pittsburgh, Chicago, *U1;* Syracuse, *C11;* Detroit, *R5;* Munhall, Pa., S. Chicago, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Reading, Pa., *C2.*

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard & Coated Nails	Woven Wire Fence	"T" Fence Posts	Single Loop Bale Ties	Galv. Barbed and Twisted Barbless Wire	Merch. Wire Annl'd ¢/lb.	Merch. Wire Galv. ¢/lb.
	Col	Col	Col	Col	Col		
Alabama City *R3*	173	187	...	212	193	9.00	9.55
Aliquippa *J3***	173	190	...	...	190	9.00	9.675
Atlanta *A8***	173	191	...	212	197	9.00	9.75
Bartonville *K2***	175	193	183	214	199	9.10	9.85
Buffalo *W6*	...	...	...	...	...	9.00	9.55*
Chicago *N4*	173	191	177	212	197	9.00	9.75
Chicago *R3*	...	...	...	...	...	9.00	9.55
Chicago *W7*	173	...	...	...	...	9.00	9.55†
Cleveland *A6*	...	...	...	...	...	...	...
Cleveland *A5*	...	...	...	...	...	9.00	...
Crawf'dav. *M4***	175	193	...	214	199	9.10	9.85
Donora, Pa. *A5*	173	187	...	212	193	9.00	9.55
Duluth *A5*	173	187	177	212	193	9.00	9.55
Fairfield, Ala. *T2*	173	187	...	212	193	9.00	9.55
Galveston *D4*	9.10‡	...	...	...	...	...	...
Houston *S2*	178	192	...	217	198	9.25	9.80†
Jacksonville *M4*	184-1	197	...	219	203	9.10	9.775
Johnstown *B3***	173	190	177	...	196	9.00	9.675
Joliet, Ill. *A5*	173	187	...	212	193	9.00	9.55
Kokomo *C9**	175	189	...	214	195*	9.10	9.65*
L. Angeles *B2****	...	...	...	...	...	9.95	10.625
Kansas City *S2**	178	192	...	217	198*	9.25	9.80†
Minnequa *C6*	178	192	182	217	198†	9.25	9.80†
Palmer, Mass. *W6*	...	...	...	...	...	9.30	9.85*
Pittsburg, Cal. *C7*	192	210	...	...	213	9.95	10.50
Rankin Pa. *A5*	173	187	...	...	193	9.00	9.55
So. Chicago *R3*	173	187	...	...	193	8.65	9.20
S. San Fran. *C6*	...	...	...	236	...	9.95	10.50
SparrowsPt. *B3***	175	...	...	215	198	9.10	9.775
Struthers, O. *Y1**	...	...	...	...	...	8.65	9.20
Worcester *A5*	179	...	...	...	...	9.30	9.85
Williamsport *S5*	...	...	...	...	...	...	...

* Zinc less than .10¢. *** .10¢ zinc.
** 13-13.5¢ zinc. † Plus zinc extras.
‡ Wholesalers only.

PIPE AND TUBING

Base discounts (pct) f.o.b. mills. Base price about $200 per net ton.

	BUTTWELD														SEAMLESS							
	½ In.		¾ In.		1 In.		1¼ In.		1½ In.		2 In.		2½–3 In.		2 In.		2½ In.		3 In.		3½–4 In.	
STANDARD T. & C.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
Sparrows Pt. *B3*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Youngstown *R3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Fontana *K1*	*10.75	*26.00	*7.75	*22.00	*4.25	*17.50	*1.75	*16.75	*1.25	*15.75	*0.75	*15.25	0.75	*15.50								
Pittsburgh *J3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Alton, Ill. *L1*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Sharon *M3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Fairless *N2*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Pittsburgh *N1*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Wheeling *W5*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Wheatland *W4*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Youngstown *Y1*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Indiana Harbor *Y1*	1.25	*14.0	4.25	*10.0	7.75	*5.50	10.25	*4.75	10.75	*3.75	11.25	*3.25	12.75	*3.50								
Lorain *N2*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Youngstown *R3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Fairless *N2*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Fontana *K1*	*6.25		*2.25		0.75		1.25		1.75		2.25		2.75									
Pittsburgh *J3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Alton, Ill. *L1*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Sharon *M3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Pittsburgh *N1*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Wheeling *W5*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Wheatland *W4*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Youngstown *Y1*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Indiana Harbor *Y1*	5.75	*8.0	9.75	*4.0	12.75	0.50	13.25	*0.75	13.75	0.25	14.25	0.75	14.75	*0.50								
Lorain *N2*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50

Threads only, buttweld and seamless, 2¼ pt. higher discount. Plain ends, buttweld and seamless, 3-in. and under, 5½ pt. higher discount.

Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ½, ¾ and 1-in., 2 pt.; 1¼, 1½ and 2-in., 1½ pt.; 2½ and 3-in., 1 pt., e.g., zinc price range of over 13¢ to 15¢ would lower discounts on 2½ and 3-in. pipe by 2 points; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 12.50¢ per lb.

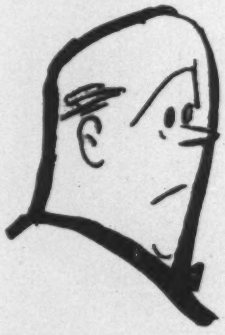
CAST IRON WATER PIPE INDEX

Birmingham	125.8
New York	138.6
Chicago	140.0
San Francisco-L. A.	148.6

Dec. 1955, value, Class B or heavier 5 in. or larger, bell and spigot pipe. Explanation: p. 57, Sept. 1, 1955, issue. Source: U. S. Pipe and Foundry Co.

COKE

	Net-Ton
Furnace, beehive (f.o.b.)	
Connellsville, Pa.	$14.75 to $15.50
Foundry, beehive (f.o.b.)	$18.50
Foundry oven coke	
Buffalo, del'd	$33.25
Chattanooga, Tenn.	30.80
Ironton, O., f.o.b.	30.50
Detroit, f.o.b.	32.00
New England, del'd	33.55
New Haven, f.o.b.	31.00
Kearny, N. J., f.o.b.	31.25
Philadelphia, f.o.b.	31.00
Swedeland, Pa., f.o.b.	31.00
Painesville, Ohio, f.o.b.	32.00
Erie, Pa., f.o.b.	32.00
St. Paul, f.o.b.	31.25
St Louis, f.o.b.	33.00
Birmingham, f.o.b.	30.35
Milwaukee, f.o.b.	32.00
Neville Is., Pa.	30.75



PUZZLED . . .

about personnel problems

Has your present recruiting program fallen down? Having trouble locating the right man? The IRON AGE Employment Exchange is the meeting place for employers and men qualified in all phases of the metalworking and metal producing industry.

For advertising rates, write to Chestnut and 56th Sts., Philadelphia 39, or complete coupon on page 90.

RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Tie Plates	Track Bolts Untreated
Bessemer *U1*	5.75	6.725	7.25	.....	.....	.....
Cleveland *R3*	.....	.....	.....	.....	.....	15.35
So. Chicago *R3*	.....	.....	.....	10.10	.....	.....
Ensley *T2*	5.75	6.725	.....	.....	.....	.....
Fairfield *T2*	.....	6.725	.....	10.10	6.875	.....
Gary *U1*	5.75	.....	.....	.....	6.875	.....
Huntington, *C16*	.....	6.725	.....	.....	.....	.....
Ind. Harbor *I3*	.....	.....	.....	10.10	.....	.....
Johnstown *B3*	.....	6.725	.....	.....	.....	.....
Joliet *U1*	.....	.....	7.25	.....	.....	.....
Kansas City *S2*	.....	.....	.....	10.10	.....	15.35
Lackawanna *B3*	5.75	6.725	7.25	.....	6.875	.....
Lebanon *B3*	.....	.....	7.25	.....	.....	15.35
Minnequa *C6*	5.75	7.225	7.25	10.10	6.875	15.35
Pittsburgh *S14*	.....	.....	.....	.....	.....	15.35
Pittsburgh *J3*	.....	.....	.....	10.10	.....	.....
Seattle *B2*	.....	.....	.....	.....	6.75	15.85
Steelton *B3*	5.75	.....	7.25	.....	6.875	.....
Struthers *Y1*	.....	.....	.....	10.10	.....	.....
Torrance *C7*	.....	.....	.....	.....	6.75	.....
Williamsport *S5*	.....	6.725	.....	.....	.....	.....
Youngstown *R3*	.....	.....	.....	10.10	.....	.....

C-R SPRING STEEL

Cents Per Lb F.o.b. Mill	CARBON CONTENT 0.26-0.40	0.41-0.60	0.61-0.80	0.81-1.05	1.06-1.35
Anderson, Ind. *G4*	8.95	10.40	12.60	15.60	18.55
Baltimore, Md. *T8*	9.50	10.70	12.90	15.90	18.85
Bristol, Conn. *W12*	.....	10.70	12.90	16.10	19.30
Boston *T8*	9.50	10.70	12.90	15.90	18.85
Buffalo, N. Y. *R7*	8.95	10.40	12.60	15.60	18.55
Carnegie, Pa. *S9*	8.95	10.40	12.60	15.60	18.55
Cleveland *A5*	8.95	10.40	12.60	15.60	18.55
Dearborn *S1*	9.05	10.50	12.70	.....	.....
Detroit *D1*	9.05	10.50	12.70	15.70	.....
Detroit *D2*	9.05	10.50	12.70	.....	.....
Dover, O. *G4*	8.95	10.40	12.60	15.60	18.55
Evanston, Ill. *M8*	9.05	10.40	12.60	15.60	.....
Franklin Park, Ill. *T8*	9.05	10.40	12.60	15.60	18.55
Harrison, N. J. *C11*	.....	.....	12.90	16.10	19.30
Indianapolis *R5*	9.10	10.55	12.60	15.60	18.55
Los Angeles *C1*	11.15	12.60	14.80	17.80	.....
New Britain, Conn. *S7*	9.40	10.70	12.90	15.90	18.85
New Castle, Pa. *B4*	8.95	10.40	12.60	15.60	.....
New Castle, Pa. *M10*	8.95	10.40	12.60	15.60	.....
New Haven, Conn. *D1*	9.40	10.70	12.90	15.90	.....
Pawtucket, R. I. *N7*	9.50	10.70	12.90	15.90	18.85
Riverdale, Ill. *A1*	9.05	10.40	12.60	15.60	18.55
Sharon, Pa. *S1*	8.95	10.40	12.60	15.60	18.55
Trenton, *R4*	.....	10.70	12.90	16.10	19.30
Warren, Ohio *T4*	8.95	10.40	12.60	15.60	18.75
Worcester, Mass. *A5*	9.50	10.70	12.90	15.90	18.85
Youngstown *R5*	9.10	10.55	12.60	15.60	18.55

ELECTROPLATING SUPPLIES

Anodes

(Cents per lb, frt allowed in quantity)

Copper
- Rolled elliptical, 18 in. or longer, 5000 lb lots 43.50
- Electrodeposited, 5000 lb lots ... 36.50

Brass, 80-20, ball anodes, 2000 lb or more 50.50

Zinc, ball anodes, 2000 lb lots 20.25
(for elliptical add 1¢ per lb)

Nickel, 99 pct plus, rolled carbon, 5000 lb 1.0225
(Rolled depolarized add 3¢ per lb)

Cadmium, 5000 lb 1.50

Tin, ball anodes $1.05 per lb (approx.).

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum, N. Y.. 65.90

Copper sulphate, 25.2 Cu min, 6000 lbs per cwt, Detroit 17.45

Nickel sulfate, 5000 to 23,000 lbs... 29.00

Nickel chloride, freight allowed, 100 lb 45.00

Sodium cyanide, domestic, f.o.b. Chicago, 200 lb drums 25.00

Zinc cyanide, 100 lb, N. Y. 60.75

Potassium cyanide, 100 lb drum N. Y. 45.50

Chromic acid, flake type, 10,000 lb or more, N. Y. 30.94

METAL POWDERS

(Cents per lb, f.o.b. shipping point for ton lots or over, except as noted)

Iron Powders

Molding grade, domestic and foreign, 98 pct Fe, 100 mesh bags, freight allowed east of Miss. R. 11.50

Electrolytic Iron, melting stock, 99.87 pct Fe, truckload lots 25.75

Carbonyl Iron (200 lb lots) 88.00

Welding Grades 8.10

Cutting and Scarfing Grades 9.85

Hydrogen reduced, domestic 11.25

Copper Powders

Molding Grades
- Electrolytic, domestic, f.o.b. shipping point. 15.00†
- Atomized ..... 43.3 to 61.3
- Reduced ..... 15.00†
- Chemically Precipitated 44.5

Brass, 5000-lb lots ..... 35.2 to 50.1

Bronze, 5000-lb lots ..... 51.3 to 55.2

Chromium, electrolytic 5.00

Lead ..... 7.50†

Manganese, electrolytic ... $1.00

Molybdenum ..... $3.60 to $4.35

Nickel $1.15

Carbonyl Nickel, 20,000 lb lots $1.01

Nickel-Silver, 5000 lb lots.. 58.8 to 66.9

Silicon 70.00

Solder ..... 7.00†

Stainless Steel, 316 ..... $1.07

Stainless steel 304 ..... 89.00

Tin ..... 14.00†

Titanium, 99.25 + pct, per lb, f.o.b. $11.25

Tungsten, carbide grades... $3.25

Zinc ..... 21.0 to 34.2

† Plus cost of metal.

ELECTRICAL SHEETS

22-Gage F.o.b. Mill Cents Per Lb	Hot-Rolled (Cut Lengths)*	Cold-Reduced (Coiled or Cut Length) Semi-Processed	Fully Processed
Field	.....	? .875	.....
Armature	11.70	11.20	11.70
Elect.	12.40	11.90	12.40
Special Motor	.....	12.475	.....
Motor	13.55	13.05	13.55
Dynamo	14.65	14.15	14.65
Trans. 72	15.70	15.20	15.70
Trans. 65	16.30	Grain Oriented	
Trans. 58	16.80	Trans. 80	19.70
Trans. 52	17.85	Trans. 73	20.20
		Trans. 66	20.70

Producing points: Aliquippa (*J3*); Beech Bottom (*W5*); Brackenridge (*A3*); Granite City (*G2*); Indiana Harbor (*I3*); Mansfield (*E2*); Newport, Ky. (*A9*); Niles, O. (*S1*); Vandergrift (*U1*); Warren, O. (*R3*); Zanesville, Butler (*A7*).

CLAD STEEL

Base prices, cents per lb f.o.b.

	Cladding	Plate (*L4, P2, A3, J2*) 10 pct	15 pct	20 pct	Sheet (*I2*) 20 pct
Stainless Type	302	.....	.....	.....	37.50
	304	28.80	31.55	34.30	40.00
	316	42.20	46.25	50.25	58.75
	321	34.50	37.75	41.05	47.25
	347	40.80	44.65	48.55	57.00
	405	24.60	26.90	29.25	.....
	410	22.70	24.85	27.00	.....
	430	23.45	25.65	27.90	.....

CR Strip (S9) Copper, 10 pct, 2 sides, 43.40; 1 side, 36.35.

(Effective Dec. 23, 1960)

REFRACTORIES

Fire Clay Brick

	Carloads per 1000
Super duty, Mo., Pa., Md., Ky....	$185.00
High duty (except Salina, Pa., add $5.00)	140.00
Medium duty	125.00
Low duty (except Salina, Pa., add $2.00)	103.00
Ground fire clay, net ton, bulk...	22.50

Silica Brick

Mt. Union, Pa., Ensley, Ala.	$158.00
Childs, Hays	163.00
Chicago District	168.00
Western Utah	183.00
California	185.00
Super Duty Hays, Pa., Athens, Tex., Windham, Warren, O.	163.00-168.00
Silica cement, net ton, bulk, Chicago	26.75
Silica cement, net ton, bulk, Ensley, Ala.	27.75
Silica cement, net ton, bulk, Mt. Union, Pa.	25.75
Silica cement, net ton, bulk, Utah and Calif.	39.00

Chrome Brick

Standard chemically bonded, Baltimore, Md.	$620.00
Gary, Ind.	658.50
Standard, Pascagoula, Miss.	647.50
Standard chemically bonded, Curtiner, Calif.	119.00
Burned, Baltimore	585.00

Magnesite Brick

Standard, Baltimore	$715.00
Chemically bonded, Baltimore	655.00
Chemically bonded, Pascagoula, Miss.	682.50

Grain Magnesite

St. ⅜ to ½-in. grains

	Per net ton
Domestic, f.o.b. Baltimore in bulk.	$73.00
Domestic, f.o.b., Pascagoula, Miss...	80.00
Domestic, f.o.b. Chewalah, Wash., Luning, Nev. in bulk	46.00
in sacks	52.00-54.00

Dead Burned Dolomite

F.o.b. bulk, producing points in: Pa., W. Va., Ohio	$16.75
Missouri Valley	15.60
Midwest	17.00

ELECTRODES

Cents per lb. f.o.b. plant, threaded, with nipples, unboxed.

GRAPHITE Diam. (In.)	Length (In.)	Price	CARBON* Diam. (In.)	Length (In.)	Price
24	84	27.25	40	100, 110	12.50
20	72	26.50	35	110	11.20
18	72	27.50	30	110	11.70
14	72	27.25	24	72	11.95
12	72	28.25	20	90	11.55
10	60	29.50	17	72	12.10
10	48	30.00	14	72	12.55
7	60	29.75	10	60	13.80
6	60	33.25	8	60	14.25
4	40	37.00			
3	40	39.25			
2½	30	41.50			
2	24	64.00			

* Prices shown cover carbon nipples.

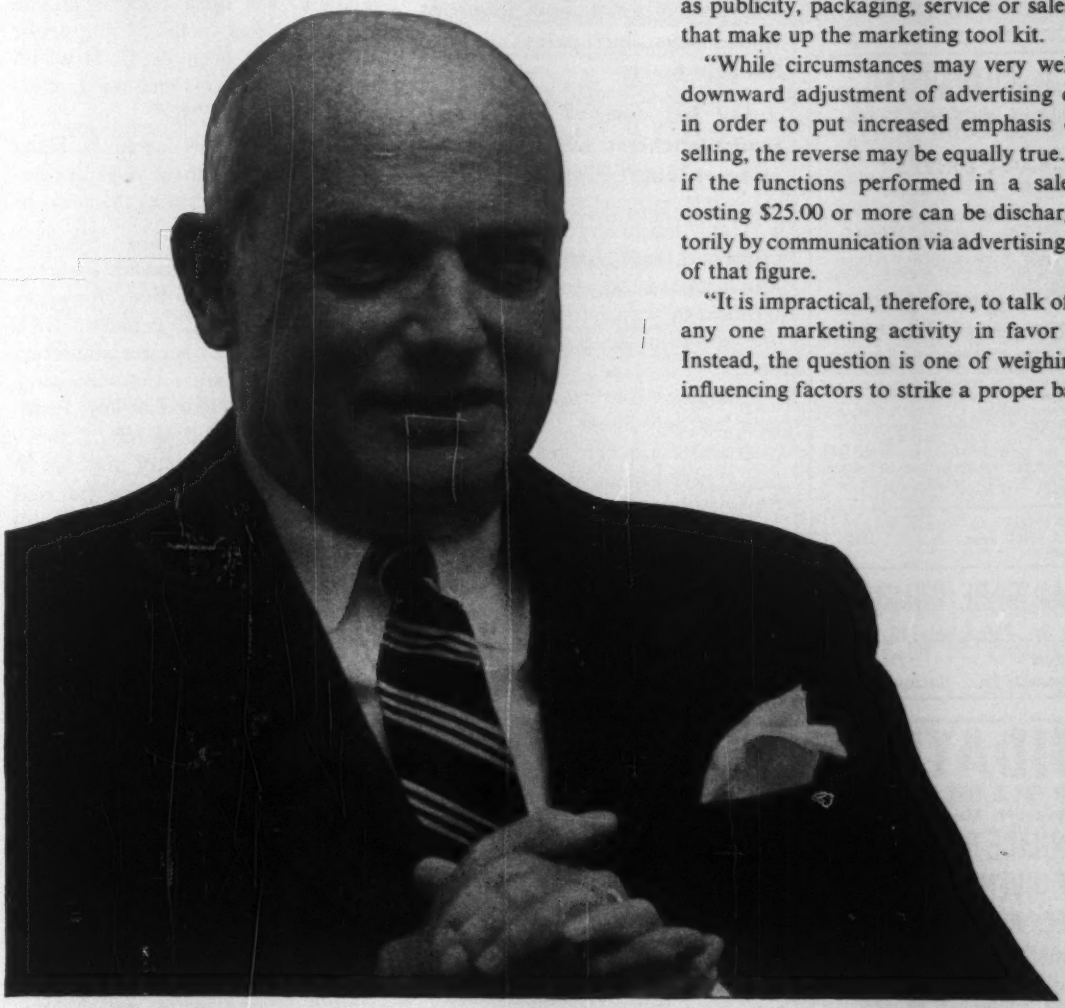
BOILER TUBES

$ per 100 ft. carload lots cut 10 to 24 ft. F.o.b. Mill	Size OD-In.	B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
Babcock & Wilcox..	2	13	40.28	47.21	35.74
Jones & Laughlin *	2½	12	54.23	63.57	48.13
	3	12	62.62	73.40	55.59
	3½	11	73.11	85.70	65.84
	4	10	97.08	113.80	88.10
National Tube.....	2	13	40.28	47.21	35.74
	2½	12	54.23	63.57	48.13
	3	12	62.62	73.40	55.59
	3½	11	73.11	85.70	65.84
	4	10	97.08	113.80	88.10
Pittsburgh Steel...	2	13	40.28	47.21	.....
	2½	12	54.23	63.57	.....
	3	12	62.62	73.40	.....
	3½	11	73.11	85.70	.....
	4	10	97.08	113.80	.....

* Electricweld only.

"Why not cut out advertising and use the money to hire more salesmen?"

ROBERT HELLER, for 30 years a consultant to management of leading industrial firms and head of Robert Heller & Associates, Inc., Cleveland, answers a question that has crossed the minds of countless business executives.



"Advertising, although indispensable in our modern economy, can never perform the entire marketing job by itself. But neither can direct selling, nor any other single one of such sales-producing influences as publicity, packaging, service or sales promotion that make up the marketing tool kit.

"While circumstances may very well indicate a downward adjustment of advertising expenditures in order to put increased emphasis on personal selling, the reverse may be equally true. Particularly if the functions performed in a salesman's call costing $25.00 or more can be discharged satisfactorily by communication via advertising at a fraction of that figure.

"It is impractical, therefore, to talk of eliminating any one marketing activity in favor of another. Instead, the question is one of weighing all of the influencing factors to strike a proper balance."

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USED and RECONDITIONED

RAILWAY CARS and REPAIR PARTS

AIR DUMP CARS
4, 30 cu. yd., Drop-Door Type
All-Steel Construction

3—FLAT CARS

HOPPER CARS
Open Top—Also COVERED
Excellent Condition — Immediate Delivery

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(1)—3000-HP G.E. Motor 90/180 R.P.M. and 3000-KW. Al-Chal. M-G Set, 600-VDC & 5000-HP Syn. Motor, 13800/6900/4160-VAC.
(1)—2200-HP Whse. Motor 92/132 R.P.M. and 2000-KW M-G Set, 600-VDC & 2750-HP Syn. Motor, 4160/2300-V.
(1)—1500-HP G.E. Motor, 165/280 R.P.M.
OR
(1)—1500-HP Whse. Motor, 300/700 R.P.M. and 1500-KW G.E. M-G Set, 250-VDC, 2100-HP Syn. Motor, 4600/2300-VAC.
(2)—750-HP Whse. Motors, 300/700 R.P.M. and 3-unit M-G Set, (2) 600-KW Generators and 1750-HP Syn. Motor, 4000/2300-VAC.
(2)—235-HP Whse. Motors, 325/975 R.P.M. and 3-unit M-G Set, (2) 250-KW Generators and 700-HP Syn. Motor, 4000/2300-VAC.
All D.C. Motors are enclosed, forced ventilated; will sell any of these items separately; can also supply Starting Equipment for Syn. Motors, Exciter Sets and D.C. Control.

SPECIAL — Outdoor Air Circuit Breakers, G.E., type ARA, 1200 amps., 14.4-KV, 1000-MVA Int. Capacity.

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BLAST FURNACE Rebuilt 1958
108 COKE OVENS New 1950
6 TON ELEC. BRIDGE 231' Span
80' Cantilever
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HEAT & POWER CO., INC.
60 East 42nd St., New York 17, N. Y.
201 Rover St., Everett, Mass.
SALES AGENT for HARCON-LIPSETT

Ohio Dealers Offer Bargains

Used machinery dealers in Ohio are finding business bad. There are very few inquiries these days, but prices are at bargain levels.

The big demand is for specialty machines which do a variety of jobs.

■ Used machinery companies in Cleveland and Northeastern Ohio are resigned to continued slow business at least into the first quarter, according to one industry expert.

"Inquiries for first quarter business are only about 25 pct of normal and there are loads of offerings," says Elmer W. Pfeil, veteran Cleveland used machinery dealer. "There are hardly any little one-man shops being set up these days."

The major bright spot is that buyers never had a better chance for bargains. And a few specialty machines are still in good demand.

High Prices—Most unusual aspects of the present Ohio picture are the high prices still being paid at liquidation and surplus sales, the industry's multiple listing service facing microfilm competition, and small machine shops scrambling for business.

"Potential buyers will rarely get the selection of bargains that is now being offered," says Mr. Pfeil. "Every dealer has good sized stocks of top rate equipment. We have, for example, a 1943 Landis 14 by 72 in. cylindrical grinder which sells new for $18,000. It's offered at $6000. A No. 41 Lucas 3 in. horizontal boring mill selling new now at about $15,000, is offered at $6000. And a No. A5½ 110-130 ton open back inclinable Niagara press with 5 in. stroke that's hardly been used. It would cost $12,000 new, and we're offering it for $6000."

About half the machines being sold at auctions these days are going direct to users and the remainder to the dealers.

Where's the Demand? — Some specialty machines like ironworkers are in good demand. This unique machine operates similar to a mechanical press but will do a variety of jobs like shearing, bending, forming and similar operations. Another class of machine in steady demand are mechanical and hydraulic presses in the 100 to 300 ton class. Press brakes and shears are also wanted.

Presses are generally long-lived equipment except where a main frame or similar major component might occasionally break. They are widely used by stamping companies and plastics parts makers that currently are doing a fair volume of business. So a good used press can generally be moved within a reasonable time.

Listing Competition—The multiple listing service of the Used Machinery Dealers National Assn., started several years ago, is now running into competition from a Detroit company which also publishes magazines. Under the new plan, photos of the machine are made on microfilm and changes of film sent out twice monthly.

GUARANTEED—RE-NU-BILT

Electric Power Equipment — A. C. Motors

3 phase—60 cycle

SYNCHRONOUS

Qu.	H.P.	Make	Type	Volts	Speed
1	6000	G.E.	ATI .8P.F.	2200/6800	600
1	3500	G.E.	TS 1.0P.F.	4600/2300/4000	360
2	1750	G.E.	ATI	2200	3600
2	500	G.E.	TS 7589	2200	1200
1	400	G.E.	TS 7565	2200	1200
2	350	G.E.	ATI 1.0P.F.	2300	150
1	325	G.E.	ATI 1.0P.F.	440	1800
2	300	ElMach.	BRKT	2200	1200

SLIP RING

1	1750	G.E.	M-5798	4800	1800
1	800	Whse.	CW	500	1776
1	800	G.E.	MT-428	2300	450
1	600	Whse.	CW 4-32-D-15	440	1775
1	550	Whse.	CW	440	252
1	500	Whse.	CW	550	350
1	300	A.C.	ANT	440/2300	720
1	300	G.E.	MTP-561	2200	1200
1	250	G.E.	IM-16	220/440	875
1	250	Cr.Wh.	Size 29Q	2300	350
1	250	G.E.	MT-434Y	4000	257
1	200	G.E.	IB-13B	220	1800
2	200	Whse.	CW-899	2300	1775
1	200	G.E.	IM	2300	580
1	200	G.E.	IM	440	435
3	150	G.E.	IM-17	440	435
1	125	G.E.	MT-557	220/440	1200
1	125	A.C.	ARY	440	870
3	100	A.C.		440	695
1	100	G.E.	M-6335Z	220/440	580
1	100	Whse.	CW-754C	220/440	900

SQUIRREL CAGE

3	1500	G.E.	K	2200	3580
1	500	G.E.	FT-559AY	2300	3600
1	500	Whse.	CS-1115	2300	863/445
4	500	Whse.	CS-1216	2200	500
2	450	Ell.	F-3910	2200	1200
1	400	Whse.	CS-7151-610H	6600/4000	3585
1	300	Cont.	NL-6868	440	1780
1	300	G.E.	KT-559A	2200	1775
1	300	Whse.	CS-1002	2300	580
1	250	Whse.	CS-8758	2200	1775
2	200	Whse.	CS-8558	220/440	1750

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FOR SALE OR RENT

1500 HP Also Diesel Electric Switcher Locomotives. New 1949. Excellent Condition. 7 Available.
44 Ton Gen. Elec. Diesel Elec. Loco. Cummins 190 HP Engine. 4 Traction Motors. Rebuilt.
25 Ton Gen. Elec. Diesel Elec. Loco. New 1942. Cummins Engine.
40 Ton Ind. Brownhoist Diesel Loco. Crane. New 1946. Caterpillar Eng.
25 Ton Ind. Brownhoist #5 Diesel Loco. Crane. New 1941. Cat. Eng. Recond.
60 Ton Link-Belt K-595 Lifting Crane. 120' Boom. Cat D-17000 Diesel.

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No better values at any price

109 CFM	100 psi	6 x 7 Ing.
138 CFM	100 psi	7 x 7 Ing.—CPT—Worth.
142 CFM	125 psi	Ingersoll Rand Type 40-Jaeger.
183 CFM	150 psi	7 x 7 Joy WG9.
194 CFM	125 psi	7-7-6 x 5 Worth. M40.
234 CFM	100 psi	9 x 9 Ing.—Worth. Chic. Penn.
290 CFM	75 psi	10 x 9 Ing. ES-1.
364 CFM	100 psi	10 x 9 Joy WG9.
465 CFM	100 psi	12 x 11 1R—Amer.—CP.
502 CFM	125 psi	12 x 13 Ing. Rand. Worth.
676 CFM	100 psi	15-9¾ x 12 Ing. XRB.
688 CFM	100 psi	14 x 13 1R—CPT.
800 CFM	100 psi	14½-9 x 7 Ing. Rand XLE.
	125 hp.	Syn. 3-60-2300—8 PF
877 CFM	125 psi	17/10½ x 14—1R—XRB.
1670 CFM	100 psi	C300-300H Fuller Rotary,
	300 hp.	West. Syn. 3-60-440, 80% PF.
2520 CFM	125 psi	17-10¾ x 8 Clark CMA 4L
	350 hp.	Syn. 3-60-2300.
2600 CFM	45 psi	20-20 x 14 Ing. Rand XRE
	250 hp.	Syn. 3-60-2300—8 PF

Portable Gas-diesel 60"-800'.

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DELL AND IRON STREETS
NORTH BERGEN, N. J.
Telephone UNion 5-4848

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AMERICA'S LARGEST STOCK OF FOUNDRY EQUIPMENT

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250# LECTROMELT—185 KVA
500# LECTROMELT—200 KVA
1000# SWINDELL—500 KVA
2000# SWINDELL—1000 KVA
3000# HEROULT, Door Charge
DETROIT FURNACES—10 lb. to 3000 lb. Cap.

- **INDUCTION HEATING FURNACES**

75 KW TOCCO M.G. Induction Heater 2 station
20 KW THERMONIC Induction Heater 2 station
20 KW ECCO Induction Heater
15 KW GIRDLER Dielectric Heater

- **INDUCTION MELTING FURNACES**

20 KW AJAX Spark Gap 17# Melting
30 KW VACUUM melting, Complete—Like New
100 KW AJAX Melting Installation—Late
200 KW, 960 cycle, 1000# steel

- **HEAT TREAT FURNACES**

36"x72" Gas Fired Box, 1950°F.
4'x4'x10' Gas Fired Box 1500°F.
7' G. E. Rotary Hearth Electric, 1900°F.
36" dia. x 36" deep Electric Recirculating
42" wide roller Hearth 50'L w/atmos. gen.
24"x16'Lx36" 210 KW conveyor, 1400°F.
10"x12"x24" LINDBERG 2500°F. hydrogen

- **CLEANING EQUIPMENT AND GRINDERS**

15x20 WHEELABRATOR
20x27 WHEELABRATOR
27x36 WHEELABRATOR w/loader
36x42 WHEELABRATOR w/loader
48x42 WHEELABRATOR w/loader
48x72 WHEELABRATOR w/loader
dust Collectors available for all machines
#1A WHEELABRATOR Multi-table
#2 WHEELABRATOR Multi-table
WHEELABRATOR Pipe Cleaning Cabinet to 12" O.D.
6' LG PANGBORN Table
9' LG PANGBORN Table
6' LK PANGBORN Table-room
WHITING 26"x54" tumbling barrel

72" WHEELABRATOR SWING TABLE
Capable of handling work 72" in diameter & 40" high, complete w/2 aux. tables, #8 Model 70 dust collector & many Long Lyfe spare parts.
SAVE — SAVE — SAVE — SAVE — SAVE

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AMERICA'S LARGEST CRANE REBUILDING SERVICE

- ANY CRANE CAN BE MODERNIZED TO THE MOST EXACTING SPECIFICATIONS
- MECHANICAL & ELECTRICAL RECONDITIONING
- BRIDGE SPANS & HEADROOM ALTERED
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THE SIGN OF QUALITY—THE MARK OF DEPENDABILITY

GEAR SHAPERS
Type Z Fellows Horizontal, m.d.
No. 4 Fellows Enveloping Gear Generator, m.d.
No. 12 Fellows Gear Shaving Machine, m.d., late
No. 7 Fellows, 1945
No. 7, 7A Fellows, belted, m.d.
No. 18 Fellows Gear Finishing Machine, m.d.
No. 61A Fellows, m.d., latest type, m.d., 1945
No. 645A3 Fellows, vee belt drive
No. 645Y Fellows, m.d.
No. 60 Cross Gear Tooth Rounder or pointing machine, m.d.
No. 70 Cross Deburring Machine, m.d., 1940
No. 72 Fellows H.S. Spur Gear, m.d.
No. 75 Fellows, H.S., m.d.
No. 75A Fellows H.S. Spur & Helical, m.d.
No. 712 Fellows, m.d.
No. 725 Fellows, m.d., 1945
No. 7125A Fellows, H.S., m.d.

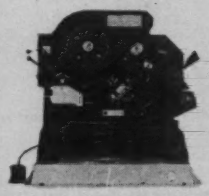
GEAR CUTTERS
No. 12 Gleason Straight Tooth Bevel Gear Rougher, m.d.
No. 36 Gould & Eberhardt Bevel & Spur Gear Rougher, m.d.
No. 48 Fellows Gear Burnisher
No. 88 Fellows Gear Burnisher
3" Gleason Gear Generator, m.d.
No. 5 AC Lees-Bradner Heavy Type Gear Generator, m.d.
No. 4—48" Brown & Sharpe, m.d.
No. 50 Cross Clutch Miller, m.d.
No. 5—60" Brown & Sharpe Gear Cutter, m.d.
W. C. Lipe Gear Chamfering, m.d.

GEAR HOBBING MACHINES
Type A Barber-Colman, m.d.
Type S Barber-Colman, m.d.
Type T Barber-Colman, m.d.
No. 1 Lees-Bradner Universal, m.d.
No. 3 Barber Colman, m.d., 1945
No. 5 Newark Automatic, m.d.
No. 12 Barber-Colman, double overarm, m.d.
No. 12 Barber-Colman, single overarm, m.d.
No. 34 Brown & Sharpe, m.d.
No. 130 Cleveland Vertical Rigid Hobber
No. 12H Gould & Eberhardt Universal Mfg. Gear Hobber, m.d.

We carry on average stock of 2,000 machines in our 11 acre plant at Cincinnati. Visitors welcome at all times.

THE EASTERN MACHINERY COMPANY
1002 Tennessee Avenue, Cincinnati 29, Ohio
MElrose 1-1241 CABLE ADDRESS—EMCO

HIGHER CAPACITY
MODERN DESIGN
LOWER PRICE



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Sizes Jr., #0, #½, #1½, #2½
Immediate delivery in your area
Write for brochure and nearest dealer

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E·G·HELLER'S SON INC.
RA 3-8821 7039 E. SLAUSON, L.A. 22, CALIF.

AN UNUSUAL OPPORTUNITY to save on equipment in excellent condition, priced for immediate sale and shipment.

78" S. A. Shrader Circular electric magnet (1956) #2758 w/Lincoln 400 amp belt driven welding generator converted for magnet operation w/Rud-O-Matic tagline #1648 with 300-H Shrader control gear #2314.

51" Circular electro magnet (Stivert-German made) w/15 KW D. C. generator powered by Jeep waterproof engine w/Cutler Hammer control box & #648 McCaffrey Ruddock tagline.

Fairbanks Morse Truck Scale 100,000 lb. capacity (1950); registering beam 60' truck bed supports.

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WALLACK BROTHERS

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WANTED by manufacturer — 5 small pressbrakes—4 and 6 ft. 30 ton cap.—also 1 Bliss 28 and 5 Bliss 21S Presses or equivalents—must be in excellent condition—send full information and prices.

BOX 135
c/o The IRON AGE, Chestnut at 56th, Phila. 39

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HIGHEST PRICES PAID

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WANTED
BRIDGE CRANES

ARNOLD HUGHES COMPANY
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Purchasing Dept.

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NEW *WANTED* USED

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Large, Reputable, Well Rated, Aggressive Steel Service Center, presently specializing only in Carbon Steel Products, fully diversified, wishes to further diversify in other related products as stocking distributor or sales rep. Located in mid-far west area. What have you to offer? Reply

BOX H-133
c/o The IRON AGE, Chestnut at 56th, Phila. 39

CONTRACT MANUFACTURING

This section appears in the first and third issue each month. Contract Manufacturing listings carry the announcements of plants offering specialized experience and facilities for the production of stampings, spinnings, weldments, wire forms, springs, screw machine products, forgings, castings, gears, dies, assemblies, special machinery, and services such as machine work, heat treating, plating, galvanizing, etc.

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GENERAL MANAGER
FOR SMALL MIDWESTERN STEEL ROLLING MILL

Merchant or Bar Mill experience required. Age 35 to 55. All replies strictly confidential. Submit resume of experience to

BOX H-128
c/o The IRON AGE, Chestnut at 56th, Phila. 39

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BOX H-136, c/o The IRON AGE
Chestnut at 56th, Phila. 39

Pipe Sales Engineer wanted by international company, headquarters in the Eastern US. Knowledge of market and previous experience required.

Box H-131
c/o The IRON AGE, Chestnut at 56th, Phila. 39

DIRECTOR OF PURCHASING

Thorough knowledge of modern purchasing methods, technically trained, prefer MBA 35 to 45 years of age. Will direct a group handling over half a million dollars expenditures per week for multiplant operation of nationwide company in major equipment fabrication and assembly. Salary 5 figures. Your replies kept confidential. Address

BOX H-134
c/o The IRON AGE, Chestnut at 56th, Phila. 39

ROLL DESIGNER

Previous experience required in all phases of Roll and Guide design for continuous mills. Send detailed resume and salary expected to

BOX H-129
c/o The IRON AGE, Chestnut at 56th, Phila. 39

FOREMAN TRAINEE

Medium-sized Midwestern wire mill has opening for young man 25-40 to train as fine wire department foreman. Excellent salary potential; good working conditions with all benefits. Reply in confidence, giving education, work history, and salary requirements.

BOX H-132
c/o The IRON AGE, Chestnut at 56th, Phila. 39

The IRON AGE Chestnut & 56th Sts., Philadelphia 39, Pa.

Please send me rates and general information about the Classified Section without obligation on my part.

Name ..... Title .....

Company .....

Street .....

City ..... Zone ..... State .....

I am interested in The Clearing House ☐, Equipment and Materials Wanted ☐, Employment Exchange ☐, Contract Manufacturing ☐.

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The IRON AGE Chestnut & 56th Sts., Philadelphia 39, Pa.

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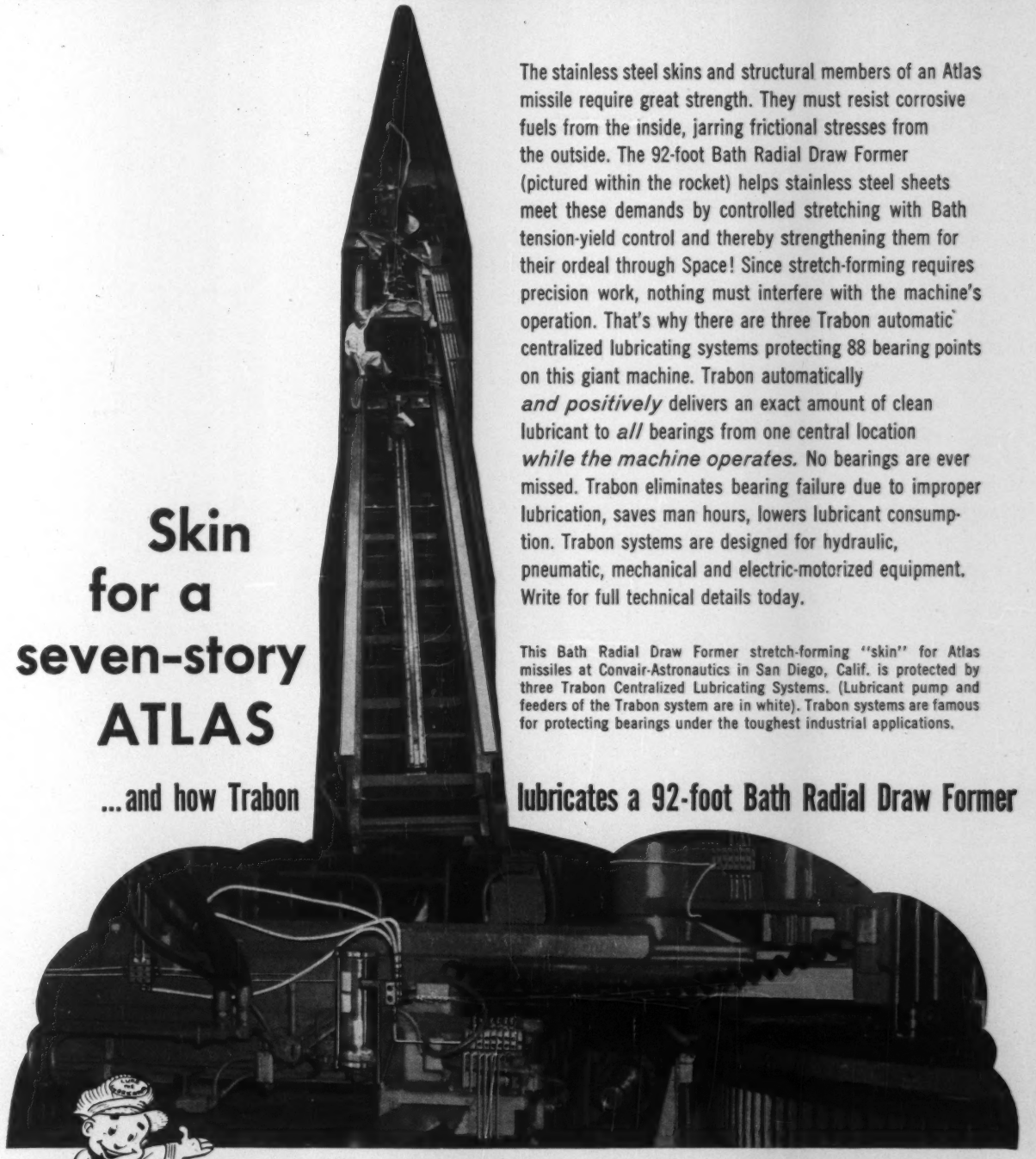

The stainless steel skins and structural members of an Atlas missile require great strength. They must resist corrosive fuels from the inside, jarring frictional stresses from the outside. The 92-foot Bath Radial Draw Former (pictured within the rocket) helps stainless steel sheets meet these demands by controlled stretching with Bath tension-yield control and thereby strengthening them for their ordeal through Space! Since stretch-forming requires precision work, nothing must interfere with the machine's operation. That's why there are three Trabon automatic centralized lubricating systems protecting 88 bearing points on this giant machine. Trabon automatically *and positively* delivers an exact amount of clean lubricant to *all* bearings from one central location *while the machine operates.* No bearings are ever missed. Trabon eliminates bearing failure due to improper lubrication, saves man hours, lowers lubricant consumption. Trabon systems are designed for hydraulic, pneumatic, mechanical and electric-motorized equipment. Write for full technical details today.

Skin for a seven-story ATLAS

...and how Trabon lubricates a 92-foot Bath Radial Draw Former

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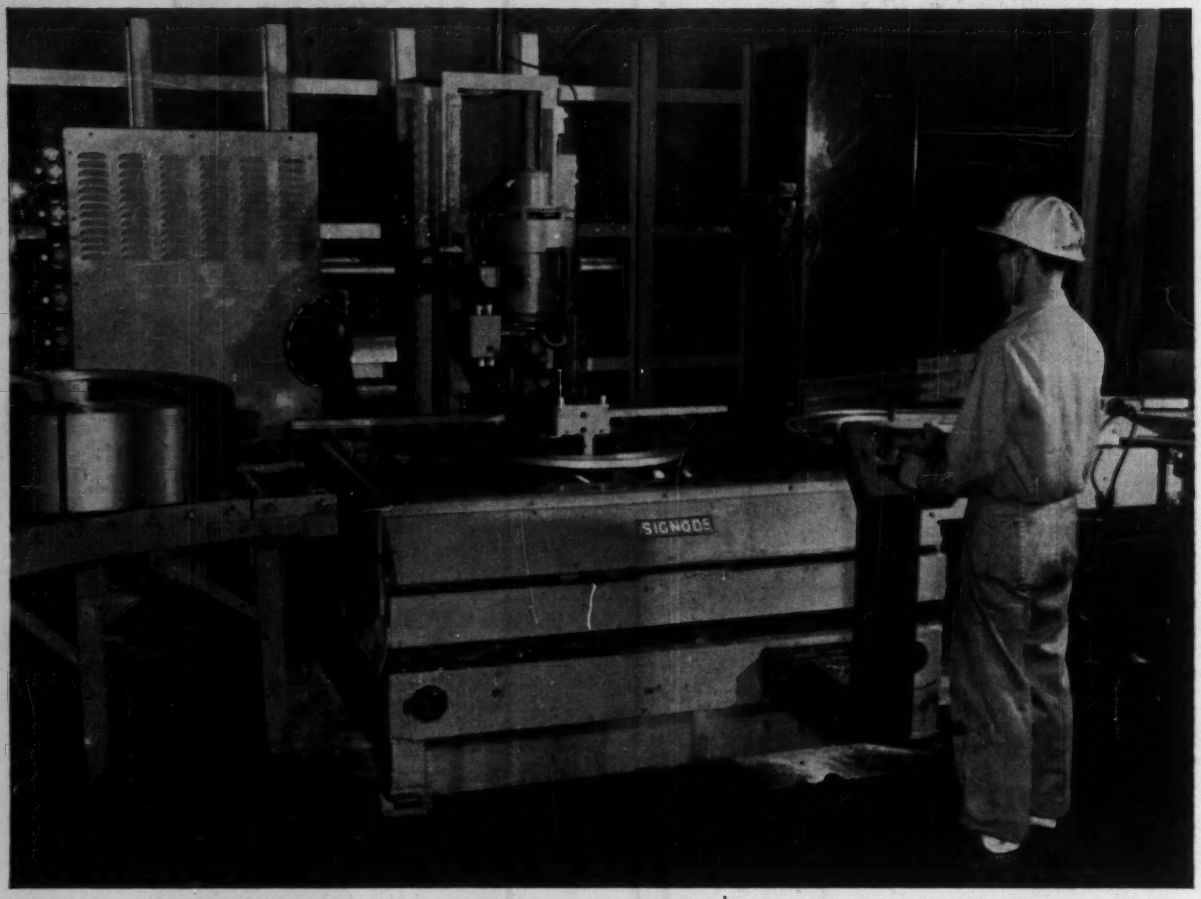

Fast new Signode M20 strip coil strapping machine

Push a button, and this Signode M20 feeds the strapping through the eye of the coil and tensions, seals, and severs it—all in a few seconds. Push another button, and the machine rotates the coil for the next strap. The operator can apply two, three, four or more straps per coil.

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The machine puts the seal on the upper face of the coil. There are several advantages to this: working parts last longer because they are subject to minimum dirt and grit, accessibility for servicing is excellent, the seal is in plain sight.

A wide range of M20's is available on a deposit or annual rental basis, for strapping products of almost any shape and size up to six feet in diameter, using strapping from ⅜ to ¾ inches wide.

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